

**DMV High Risk Drivers Identification Procedures
Program Assessment
(Eight-Year Driver License Renewal Study)**

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Final Report

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NOTICE

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16. Abstract Based on the limited data available at this time, there is some evidence that extending the renewal period past four years may have a detrimental impact with respect to accidents and citations. However, these result are preliminary in nature and the long-term results may be very different. Preliminary results from this study are based on a small segment of the driving population over a short period of time. The analysis should be updated as more drivers convert to the eight-year renewal cycle and additional data becomes available to confirm these results and provide a better estimate of the overall impacts. While the number of crashes and citations for drivers with behavior reports are still higher than those of the overall population in most cases, the reductions in incidents after the submission of these reports are striking. Thus these reports appear to be an effective tool for reducing the number of crashes and citations, and they play an important role in the identification of high-risk drivers.			
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Executive Summary

Background

In Wisconsin, one method of identifying high-risk drivers is through the walk-in license renewal process where information is gathered by Division of Motor Vehicle (DMV) personnel and drivers are observed. In February 1998, the State of Wisconsin began issuing and renewing driver licenses for a period of eight years, cutting by half the frequency at which drivers are observed at a DMV office. The change is primarily a cost-saving measure. The primary purposes of this study are to develop a method for assessing the impacts of moving from a four-year to an eight-year renewal period for driver licensing and, if possible, to make preliminary estimates of these impacts.

The extent to which high-risk drivers are identified through the walk-in renewal process is unknown. In light of the change in renewal cycles, it would be useful to know how effective other methods are in identifying high-risk drivers and reducing the risks associated with them. Another objective of this study is to evaluate the effectiveness of one such method, the Driver Condition/Behavior Report (also referred to as MV3141 or behavior report), as a tool for identifying high-risk drivers and a means of improving driving safety. A behavior report allows an individual to report conditions that may hamper a driver's ability to safely operate a motor vehicle or observed behaviors that indicate that a driver should be considered high-risk. Conditions may be physical, mental, or emotional and may or may not be caused by alcohol or other drugs. Behavior reports may be submitted by medical or law enforcement personnel. Private citizens may also submit a behavior report if they have knowledge of problems that may affect an individual's driving ability or if they have observed risky driving behavior.

The eight-year license renewal cycle is being phased in over a four-year period. Effective February 1998, the State of Wisconsin began issuing new driver licenses for a period of eight years. Implementation for transitioning existing drivers to the new cycle is occurring in one of two ways. Drivers with good driving histories are sent renewal notices allowing them to renew by mail for four additional years without having to physically visit a DMV office. All other drivers are required to appear in person at the DMV, where they receive an eight-year license if they meet renewal criteria. By 2002, all drivers will renew in person every 8 years.

Methods

The Wisconsin Department of Transportation commissioned this study in July 2000. State citation and crash data are the primary evaluation data used. All single-car and multiple-car crashes are included. For the renewal cycle analysis, this study includes only drivers holding valid regular Class D or M licenses who were 18 years or older at the date of their last license issue. All drivers with Class A, B, or C licenses are excluded.¹ Three groups of drivers are analyzed:

¹ Licenses are issued for the operation of five vehicle classes. Class A refers to combination commercial vehicles over 26,000 pounds, provided the towed unit is over 10,000 pounds. Class B represents single commercial motor vehicles over 26,000 pounds and vehicles towing less than 10,001 pounds. A Class C license is issued for vehicles not covered under Class A or B, which carry 16 or more passengers including the driver or transport hazardous

1. Drivers who renewed by mail (pre-selected by DMV because of good prior driving history)
2. Drivers who were eligible to renew by mail but renewed in person (pre-selected by DMV because of good prior driving history, but renewed in person anyway)
3. Drivers who were required to renew in person (failed to meet the good prior driving history criteria for selection for renewal by mail)

Historical data needed to distinguish between drivers in groups 1 and 2 drivers prior to January 2000 are unavailable. Thus only drivers who have renewed since January 2000 are identified for groups 1 and 2. Group 3 drivers are identified since February 1998. For analysis purposes, drivers within each group are divided into different categories based on their age and gender. Age is calculated at the date of renewal. Comparisons are not made across categories, but rather drivers within each age and gender category are evaluated based on different circumstances. In the behavior report analysis, crash and citation data for drivers with reports are analyzed from one year prior to and one year after the submission of a report.

Two different methods for evaluating the effects of a longer renewal cycle are used:

1. **Cross-group comparisons.** Two sets of measures, the number of incidents per driver and monthly incident rates, are compared among the driver groups. Incidents include crashes and citations, which are evaluated separately.
2. **Before and after comparisons.** For each group, monthly crash rates and monthly citation rates in the period prior to last license renewal are compared to these rates in the period after last license renewal.

Because of the limitations in identifying drivers in groups 1 and 2 and the need to use consistent time periods to make valid comparisons, analysis of the number of crashes and citations per driver among groups is limited to data from January 2000 through October 2000. Monthly crash and citation rates adjust for length of driving period, so all available data may be used. For analysis of crash and citation rates since last renewal, data from January 2000 through October 2000 are used for groups 1 and 2, while data from February 1998 through October 2000 are used for group 3. Because the analyses for groups 1 and 2 encompass only a short period of time and do not include the effects of November and December, caution should be used in relying heavily on these results.² In comparing rates prior to last renewal, the analysis for groups 1 and 2 uses data from January 1996 through December 1999, while the analysis for group 3 uses January 1996 through January 1998 data.

materials. A Class M covers type 1 motorcycles. Class D refers to all other vehicles, including regular passenger cars and light trucks.

² In Wisconsin, because of the weather, November and December typically have a high incidence of crashes compared to the rest of the year.

Preliminary Findings

All findings concerning the effects of the eight-year renewal period should be considered preliminary. They reflect only the best drivers and are based on less than a year's worth of data. Future studies may provide completely different results. The earliest date at which representative data will be available for a definitive study is 2004.

- For the overall driving population, drivers who renewed by mail have fewer crashes and citations per driver as well as lower monthly crash and citation rates in the period after last license renewal than both groups of drivers who renewed in person.
- A comparison of driving histories across groups for a period of time prior to implementation of the longer renewal cycle policy shows that drivers designated as group 1 had lower incident rates than those placed in both the renew in person groups. This suggests that there may be other underlying factors that differentiate drivers among the groups, making cross-group comparisons since the inception of the eight-year renewal cycle less useful.
- Preliminary results from the before and after analysis show that overall, drivers who renewed by mail since January 2000 have higher monthly crash and citation rates now than prior to their renewal. Aggregate crash rates have increased over 50 percent and citation rates have increased 8 percent. Because of the preliminary nature of this study, it is unknown how large a role, if any, the longer renewal period plays in the results.
- Within individual categories of drivers, monthly crash rates are significantly higher after renewal by mail for all categories except for males, ages 25-29 and 30-34. Citation rates are higher in only a handful of driver categories.
- For drivers who renewed in person but were eligible to renew by mail, crash rates since last renewal are also significantly higher (nearly 50 percent) for drivers in the group overall and for half of the driver categories. Overall and for most driver categories, monthly citations rates are not significantly different.
- In contrast, aggregate monthly crash and citation rates have actually declined significantly, 24 and 22 percent, respectively, since last renewal for drivers who were required to renew in person. The decline may be overstated because not all drivers have crash and citation data from winter months in the period after their last renewal. The data may also reflect an overall trend towards declining crash and citation rates, changes in reporting and enforcement, or other factors. The reduction trend holds for most of the individual age and gender categories, except with some of the more elderly categories.
- Two factors contribute to a difficulty in understanding the differing trends in crash and citation rates among the three groups of drivers in the before and after analysis. First, the time period observed for all groups is quite short as discussed earlier. At least two full years of data are needed to adequately support interpretation of the data. Second, a lack of data from comparable time periods for all three groups prevents the useful cross-group comparisons.

- Drivers for whom behavior reports have been issued have significantly higher numbers of crashes and citations per driver than the population as a whole. The behavior report analysis shows that the number of incidents per affected driver significantly declined between the year prior to and the year after a report was issued. Monthly crash rates declined 67 to 96 percent within the individual age and gender categories, and 86 percent overall. Monthly citation rates dropped 66 percent for the group overall.

Conclusions and Recommendations

- Based on the limited data available at this time, there is some evidence that extending the renewal period past four years may have a detrimental impact with respect to accidents and citations. However, these results are preliminary in nature and the long-term results may be very different.
- Preliminary results from this study are based on a small segment of the driving population over a short period of time. The analysis should be updated as more drivers convert to the eight-year renewal cycle and additional data becomes available to confirm these results and provide a better estimate of the overall impacts.
- While the number of crashes and citations for drivers with behavior reports are still higher than those of the overall population in most cases, the reductions in incidents after the submission of these reports are striking. Thus these reports appear to be an effective tool for reducing the number of crashes and citations, and they play an important role in the identification of high-risk drivers.

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I. Introduction

In Wisconsin, one method of identifying high-risk drivers is through the walk-in license renewal process where information is gathered by Division of Motor Vehicle (DMV) personnel and drivers are observed. Prior to February 1998, Wisconsin law required drivers to renew their licenses in person every four years. Effective February 1998, the renewal period was extended to eight years in an effort to reduce costs.

The Wisconsin Department of Transportation commissioned this study in July 2000 to evaluate current driver licensing and renewal procedures in the context of the new eight-year renewal cycle. The initial objectives of the project were broad and ambitious, calling for a complete review of all aspects of driver licensing and the identification of high-risk drivers. However, resource and time constraints made it necessary to narrow the scope and focus on a few specific aspects. In particular, two primary objectives were identified: 1) develop a methodology for assessing the overall impacts of the eight-year renewal cycle and 2) evaluate the effectiveness of behavior reports.

The remainder of this report documents the research and analyses performed in meeting the study objectives. Section II explores some of the issues and potential problems that could arise from extending the length of time between license renewals. Section III documents the new license renewal process. The data sources used in this study are described in Section IV. Two methods for analyzing the overall impacts of converting from a four-year to an eight-year renewal cycle are identified and described in Section V. Section VI discusses the methods used to analyze the effectiveness of behavior reports. Preliminary results are presented in Section VII. Section VIII contains a summary of the study findings and recommendations for future analysis. The original workplan also called for a literature review of studies pertaining to driver licensing procedures and the identification of high-risk drivers. As part of this process, the licensing and renewal practices used in surrounding states were identified. These reviews are included in Appendices A and B.

II. Issues Concerning a Longer Renewal Cycle

Walk-in license renewals and behavior reports are two of several important tools that the Wisconsin Department of Transportation uses to identify high-risk drivers. The decision to extend the regular period between license renewals from four to eight years raises questions about what, if any, impacts the policy will have on traffic safety. Unfortunately, there is limited data available for assessing how large a role different elements of the walk-in license renewal (DMV observation, vision screens, and self-reporting via the license renewal application), DBCRs, and other policies and methods play in identifying high-risk drivers. This section explores some of the issues and potential problems that could arise by extending the length of the renewal cycle.

The act of safely operating a motor vehicle requires a number of skills.³ First, a driver must be able to receive sensory inputs, through sight and hearing, concerning his or her driving situation. Second, the driver must also be able to cognitively understand the situation. Third, the driver must have the decision-making skills required to respond to those circumstances. And finally, he or she must be able to physically operate the vehicle. Any physical or psychological conditions that interfere with a person's ability to perform these functions puts that driver and other individuals at risk. The Department of Transportation Medical Review Unit reviews any suspected conditions that are brought to the State's attention, either as a result of the walk-in renewal process or through the submission of behavior reports and medical reports. The Unit then decides if additional action is needed to determine whether the condition poses a safety risk, whether specific license restrictions are needed, and what follow-up may be required.

The walk-in license renewal process consists of a chain of events designed to detect possible risk characteristics. A Wisconsin driver receives a renewal notice by mail 45-60 days prior to the birthday at which the driver license expires. After receiving a renewal notice, the applicant must correct any pre-printed information, complete the renewal form, and apply for renewal in person at a DMV service center.⁴ The renewal application contains questions enabling the applicant to self-report certain behavioral or medical conditions that might indicate high risk. Applicants must also undergo a vision screen that includes acuity and field of vision, either at the DMV upon renewal or by private exam within the last three months. The minimum vision acuity standard is 20/40 in the best eye with or without correction and temporal field of vision in one eye of at least 70 degrees. If the vision standards are not met, the driver is referred to a vision specialist. In addition, DMV personnel are trained to observe applicants as they approach the counter and during the renewal process for any signs that the applicant may be high-risk. If DMV or medical review unit personnel believe that a medical report is needed, either based on the application responses or observation of the applicant, a driver may be issued a temporary license or denied a license until the report is completed. License restrictions, a driving evaluation, or other action may be initiated as a result of the vision screening and/or medical report.

A key issue in determining whether the longer renewal cycle will reduce the effectiveness of the walk-in renewal process as a tool in identifying potential high-risk drivers is the speed with which physical and psychological changes affecting driving performance may occur. Will conditions change enough to seriously hinder driving ability in eight, or even four years? If so, will other methods identify these high-risk drivers so that the effects of a longer cycle are negligible? The answers to these questions are unknown. This study provides a starting point for addressing these questions.

The speed with which age-related changes and changes in vision occur are two areas of particular concern with longer renewal cycles. The effect of aging on driving ability is one of the most controversial topics in traffic safety today. It is commonly acknowledged, that on a per-mile-driven basis, older drivers have higher crash rates than every other category of drivers except teenagers. Declines in vision, hearing, physical strength, reaction time, cognitive

³ Ellen H. Demont, "High-Risk Drivers: The Privilege to Drive Does Not Include a License to Kill," *Dickinson Law Review* 93, no. 4 (Summer 1989).

⁴ The only exception to this is the temporary license renewal by mail policy.

capacity, risk evaluation skills, and decision-making ability are often associated with aging and can affect driving skill.⁵ In addition diseases such as Alzheimer's, diabetes, glaucoma, and others become more prevalent with age and can affect driving ability. The use of certain medications may also interfere with a driver's ability to safely operate a vehicle. While many people recognize changes in themselves and seek help in overcoming these issues, some do not for fear of losing their mobility or simply because they don't realize that a problem may exist. Many of these potential problems can be addressed through additional training, special restrictions, and vehicle modifications.

"Age alone is not an accurate indicator of driving ability."⁶ One of the primary problems with using age as a determining factor for when action should be taken is that people age differently and at different rates. Vision is a good example. Vision accounts for 90 percent of the sensory input that a driver receives.⁷ In general, corrected visual acuity begins to decrease after the age of 50, and decreases rapidly after the age of 60. But there is no magic number. Some people have excellent vision well beyond the age of 60. Similarly, drivers in their twenties may experience vision changes that affect their driving abilities. Nonetheless, the incidence of visual deterioration and impairment from eye disease are significantly higher in elderly populations.⁸ In addition to a change in acuity, physical changes in the eye can lead to delayed adaptability when moving between light and dark conditions, increased glare sensitivity, and decreased ability to absorb light. Eye diseases such as cataracts, glaucoma, and macular degeneration become more prevalent. While there is little doubt that vision issues can affect driving ability, more frequent vision screening, particularly for older drivers may not be the solution. The question of whether current vision assessment methods would identify potential problems is also a question of debate.

Vision screenings in Wisconsin, like most states, consist only of tests for visual acuity and field of vision. Most standards are not very stringent. Much of the research linking vision to driving ability relies on other tests and methods that may not be feasible for use in the licensing setting. The Wood and Troutbeck study found that the high-contrast charts typically used at DMVs and doctor's offices are unlikely to detect all but gross changes in vision. Rather, the Pelli-Robson and functional field measures are more effective. Visual attention, measured by size of useful field of view (UFOV), and mental status, measured by the Mattis Organic Mental Status Syndrome Examination, has also been shown to be statistically linked to vehicle accidents in older drivers.⁹ A 1995 study evaluated five experimental vision tests: 1) Pelli-Robson Low-Contrast Acuity Test for testing the ability to see objects and borders or low contrast acuity, 2) Smith-Kettlewell Low-Luminance Card for high contrast and low contrast ability, 3) Berkeley

⁵ John C. Bodmar, "Are Older Americans Dangerously Driving into the Sunset?" *Washington Law Quarterly* 72 (1994): 1713.

⁶ Jennifer L. Klein, "Elderly Drivers: The Need for Tailored License Renewal Procedures," *The Elder Law Journal* 3, no. 2 (Fall 1995).

⁷ Ian L. Bailey and James E. Sheedy, "Vision Screening for Driver Licensure," *Transportation in an Aging Society: Improving Mobility and Safety for Older Persons* 1, Committee Report and Recommendations, Transportation Research Board, (1998): 294.

⁸ Joanne M. Wood and Rod J. Troutbeck, "Effect of Age and Visual Impairment on Driving and Vision Performance," *Research Issues in Bicycling, Pedestrians, and Older Drivers*, Transportation Research Board, (1994).

⁹ Cynthia Owsley et al., "Visual/Cognitive Correlates of Vehicle Accidents in Older Drivers," *Psychology and Aging* 6, no. 3 (1991): 413.

Glare Tester for testing low contrast in presence of glare, 4) Modified Synemed Perimeter measuring standard and attentional integrity loss, and 5) Visual Attention Analyzer for UFOV and perceptual reaction time.¹⁰ The study found that in terms of crash predictive validity, the Pelli-Robson and Visual Attention Analyzer tests could improve the identification of drivers with visual problems affecting driving ability. These and other alternatives may better identify potential high-risk drivers, but at a cost. And for the most part, states have found that the benefits, based on current research, do not outweigh the additional costs associated with more frequent or more thorough testing.

A wide variety of studies have also focused on the links between different medical conditions and driving, and the use of medications and driving. Because of the wide array of conditions and medications, it is impossible to sort through them all here. Similarly, it would be impractical for licensing agencies to test for or ask applicants about each specific condition or medication that might be affecting them and their ability to safely operate a motor vehicle. Thus states rely on self-reporting and notification by medical personnel to alert them of any potential problems. While many drivers may be reluctant to self-report, this reporting is critical to the licensing process.

III. The Switch to an Eight-Year Renewal Cycle in Wisconsin

In February 1998, the State of Wisconsin began to move from a four-year to an eight-year driver license renewal cycle. In order to spread the number of drivers who renew each year more evenly across time, implementation of the longer renewal cycle is being phased in between 1998 and 2002. During the transition period, an effort is being made to allow half of the driving population to extend their licenses for four years by issuing four-year renewals by mail. As their extended licenses expire, these drivers will be required to renew in person and will receive eight-year licenses at that time. The other half of the population still renews in person as their licenses expire, receiving eight-year licenses when they renew. Thus by 2002, all drivers will renew in person every eight years.

The initial criteria for selecting drivers for renewal by mail included several factors. Only drivers with Class D or M licenses and no endorsements were eligible. Of these drivers, those with a type “E” product notation were removed from the eligible pool.¹¹ The driver was required to have a valid driver license and could not be age 70 or older. Drivers with mandatory convictions, or six or more points in the previous three years were ineligible. Also, the driver could have no withdrawals or arrests on his or her record. Finally, there could be no change of name, date of birth, or gender in the driving record. Using these criteria, the pool of drivers extending their licenses by mail was initially too small. Substantially more than half of the drivers eligible for renewal during the first few months of the transition period renewed in

¹⁰ David F. Hennessy, *Vision Testing of Renewal Applicants: Crashes Predicted When Compensation for Impairment is Inadequate*, Division of Program and Policy Administration, California Department of Motor Vehicles, (June 1995).

¹¹ The product notation relays specific information about a driver or his/her license type. It is used to flag drivers who may require special processing at renewal. Product notations are categorized based on severity. Type “I” are informational, type “W” refer to warning notations, and type “E” reflect an error code. Type “E” notations prevent further processing of an application whereas types “I” and “W” do not.

person. In November 1998, the selection criteria were changed in two ways. First, drivers with any type of product notation in their file were not allowed to renew by mail. This change actually reduced the number of people eligible for renewal by mail. The second change was made to enlarge the pool of drivers who were chosen to renew by mail. Here, the restrictions were relaxed to allow drivers with one property damage accident to extend their licenses by mail.

IV. Available Data

Data from several different Department of Transportation databases are used in this analysis. The universe of Wisconsin drivers is identified using the July 2000 CDL, Renewal, and Print files. These are snapshot extracts taken from the Driver License File containing driver information for all driver license numbers in the system at that time. These extracts can be combined in order to identify unique drivers and categorize them based on the different criteria described later in this report. Behavior report data are from the Driver Condition Information System (DCIS). At the time of this analysis, valid data were available from 1997 through October 31, 2000.

The number of citations and crashes are the variables used as evaluation criteria in this study. The Citation Database contains information from Uniform Traffic Citations issued by law enforcement personnel. These data are available from 1996 through October 2000. It is important to note that citations are partly a function of enforcement. A decision to issue warnings in lieu of citations for minor violations is subject to officer discretion and policies may vary across time. The Accident Database contains information from all reportable accidents that occurred in Wisconsin and were filed by law enforcement agencies. While data are available from 1994 forward, only data from 1996 through October 2000 are used, for consistency with the citation data. Ideally, data about individual driving habits such as number of miles driven or when and where driving generally occurs would also be used in an analysis of this type. Unfortunately, these data are not available and could not be collected for this study.

V. Two Methods for Evaluating the Effects of Length of Renewal Cycle

In an ideal test situation, drivers would be randomly selected for two comparison groups. The test group would be issued eight-year licenses. The control group would be issued four-year licenses. Test statistics would be computed for each group and compared to determine what, if any, differences exist between the two groups. As is often the case in applied analysis, the luxury of an “ideal” test environment is not present. Instead, researchers must determine the most appropriate way of estimating the most accurate results, given the circumstances and data available.

Comparing Crashes and Citations Data Based on Renewal Type

Initially, drivers receiving a four-year extension by mail can be treated as though they received an eight-year license at their previous renewal. This can be done because they are currently entering their fifth, sixth, or seventh year since last appearing in person before the

DMV. While drivers who have renewed in person since February 1998 actually have an eight-year license, they are currently only on their first, second, or third year of the longer licenses, which is essentially no different than if they were still on a four-year renewal cycle. Thus, until February 2002, drivers who renewed by mail should be considered the test group and drivers who renewed in person are the control group. Unfortunately, because drivers were chosen for renewal by mail based on their driving history, defining the groups in this manner and comparing crash and citation data between the two groups is potentially problematic. Past driving behavior has often been found to be a good predictor of future driving behavior, particularly with respect to accidents.¹² Drivers who have a history of crashes and citations are more likely to have them in the future than those who lack that history. Any current differences in the evaluation measures between the groups occurring as a result of the differing renewal cycles may be masked by other factors.

Some of the drivers who have renewed in person since February 1998 were actually eligible for renewal by mail, but chose not to do so.¹³ Because these drivers were in the initial pool of drivers chosen for mail extensions, they could potentially serve as a better comparison group than drivers who were required to renew in person. Note that these drivers do not reflect a perfect match for comparison. One can make the argument that because these drivers chose not to renew by mail, there may be some other underlying characteristics that differentiate these drivers from those who renewed by mail. These characteristics could have some effect on analysis results. This phenomenon is often referred to as self-selection bias. Because these characteristics are unknown, the extent of the effect is also unknown. The large size of this group would tend to alleviate this problem but analysis should be performed to test for it. To do so, monthly accident and crash rates from before the drivers' last renewal have also been estimated and compared.

There is one additional consideration that warrants mention. The preliminary analysis performed here includes only data from a very short period of time. Although implementation of the new renewal process began in February 1998, data needed to identify drivers who were eligible for renewal by mail but chose to renew in person are currently only available since January 2000. Since the July 2000 snapshot files were used in this round of analysis, only drivers who renewed in that six-month period are included in the comparison groups. Of those drivers, the number of crashes and citations on each driver's record since his or her last license renewal through October 2000 are recorded. Thus a good portion of the winter driving season is not included at this time. Because of these factors, the results found in this study should be considered preliminary estimates of what may actually occur in the long run.

Given these limitations, the available data have been compiled as part of this study. Only drivers who were 18 and older at the point of their last license issue and hold a valid regular license that is Class D or M are included. Group 1 consists of those drivers who renewed by mail and have no record of having visiting the DMV since their last renewal. Group 2 includes

¹² Michael A. Gebers, *Strategies for Estimating Driver Accident Risk in Relation to California's Negligent-Operator Point System*, Research and Development Branch, California Department of Motor Vehicles, (July 1999): 30.

¹³ While no studies have been conducted to determine why many individuals chose to renew in person when they were not required to do so, another licensing policy change initiated near the same time may have encouraged drivers to do so. In 1998, the DMV also began issuing digital licenses. It is suspected that a number of drivers felt that they were required to have a digital license made or simply wanted the new license.

drivers who were eligible to renew by mail but chose to renew in person. Group 3 consists of drivers who were not eligible to renew by mail. Although group 3 is not a suitable control group for an impact analysis of the switch to an eight-year renewal cycle, it is interesting to see how the measures for this group of drivers differ from those for the other two groups. Within each group, measures are calculated for different age and gender categories. Age breakouts occur in five-year increments, e.g. 19-24, 25-29, and so forth. Age is calculated at the date of renewal.

Two sets of measures have been calculated. First, the total number of crashes per driver and the total number of citations per driver since each driver's most recent renewal are calculated for the three specific groups. Only drivers who renewed between January and July 2000 are included in all three groups because of the limitations in identifying groups 1 and 2 drivers and the need to use consistent time periods to make valid comparison. Crashes and citations from January 2000 through October 2000 are analyzed for these drivers.

The second set of measures consists of monthly crash rates and monthly citation rates. Since these monthly rates are adjusted for length of driving period, all of the available data can be used. Here as before, groups 1 and 2 include only those drivers renewing between January and July 2000. Group 3 drivers include all those not eligible to renew by mail that renewed in person between February 1998 and July 2000. As mentioned earlier, it is important to keep in mind that the rates for groups 1 and 2 do not currently contain any accident or citation data for November and December. Thus the rates estimated in this study may be low. With respect to crashes in particular, a driver is more likely to be involved in a crash during winter months in Wisconsin.

Two statistics, the F-statistic and the t-ratio, are computed to test for statistical differences across groups for each age and gender category of drivers. The F-statistic is based on the analysis of variance test of equality of means. The test compares variances within the groups to the variance between groups. This test procedure provides the ability to carry out tests of hypotheses of equality of means when more than two means are compared. The t-ratio is the basic test of equality of means where the hypothesis that there is no difference between the means of the relevant groups of comparison is tested. In all instances presented here, an F-statistic of 3.84 or more means that the two measures being compared are statistically different at a 95 percent significance level.¹⁴ Similarly a t-ratio of 1.96 or greater indicates a significant difference. Although the two statistics provide the same information with respect to significance level when comparing only two groups, both are included in the tables for different reasons.¹⁵

¹⁴ A significance level indicates the degree of statistical certainty. In this report, differences are assumed to be significant when the statistical method being used leads to correct answers 95 percent of the time.

¹⁵ The F-statistic reflects the variance and is mathematically the square of the t-ratio. The sign of the t-ratio allows one to quickly see which number is higher. For example, when comparing crash rates between groups 1 and 2, a positive t-ratio indicates that group 2 crash rates are higher than group 1 crash rates. A negative t-ratio means that group 1 rates are higher. Note that this can also be determined by looking at the crash rates for each group.

Comparing Crash and Citation Rates Before and After Last Renewal

An alternative method for evaluating the effects of a longer renewal period given the realities of this study environment is to compare monthly crash and citation rates for group 1 drivers from before they renewed by mail to after they renewed by mail. This approach eliminates the earlier issues concerning differences in the characteristics between the test and control groups that might affect the measures calculated for each group. In this case, the measures all relate to the same group of drivers, but they reflect different points in time. It should be noted that external changes in driving conditions such as traffic congestion, weather, enforcement, traffic laws, and others may contribute to any differences in crash and citation rates between the two time periods being compared.

To help determine the extent to which the time difference may affect monthly crash and citation rates for drivers who renewed by mail, accident and citation rates are also calculated for drivers who did not renew by mail. In this case the element of interest, a longer renewal cycle, is absent. Thus any changes in crash and citation rates for those drivers since their last renewal reflect those external factors.

For each group, the “before” incident rates were calculated based on the period beginning January 1, 1996 through the day of a driver’s most recent renewal. The “after” rates are an average from that renewal date through October 31, 2000. Rates are shown separately for drivers whose last renewal was by mail (group 1), drivers who were eligible to renew by mail but renewed in person (group 2), and drivers who were required to renew in person (group 3). Because the “after” period does not reflect a full year with respect to groups 1 and 2 drivers, these comparisons should be considered preliminary. Again F-statistics and t-ratios have been calculated to determine whether there are significant differences.

VI. Methodology for Evaluating Driver Condition/Behavior Reports

Because the longer renewal cycle reduces the opportunities for DMV personnel to observe drivers in person and identify potentially high-risk drivers, the use of other tools for identifying high-risk drivers becomes more important. Behavior reports are among these tools. Law enforcement personnel and health professionals, private citizens, or Department personnel such as DMV examiners may submit a report when they have knowledge of or observe behavior that leads them to question a driver’s ability. Table 1 lists the number of reports submitted in the last ten years by source. Consistently, over half are submitted by law enforcement personnel, based on observed behavior. Health professionals also play a major role, accounting for nearly 23 percent of the reports submitted in 2000. The remaining sources account for relatively small percentages of the total. The use of behavior reports has steadily increased over the past ten years, growing over 30 percent. While it is unknown how many problem drivers actually exist,

with a population of over 3.7 million licensed drivers, the use of these reports is relatively small.¹⁶

Table 1: Driver Condition/Behavior Reports by Informant Type and Year

Informant	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Law Enforcement	1,399	1,415	1,420	1,410	1,545	1,515	1,617	1,840	1,905	1,915
Health Professional	479	532	497	497	489	500	543	588	564	631
Citizen	105	80	80	78	90	82	86	111	87	101
Examinor	73	77	60	54	69	67	60	41	47	37
Assessor	3	0	0	1	2	6	11	3	4	3
HP Nurse	57	62	53	50	48	53	58	58	84	68
Accident	0	0	0	1	2	3	13	4	1	0
One Signature	0	0	2	20	12	8	22	18	16	20
Out of State	0	0	0	4	3	1	4	1	4	8
Anonymous	0	0	0	0	0	0	0	1	1	0
Total	2,116	2,166	2,112	2,115	2,260	2,235	2,414	2,665	2,713	2,783

To evaluate the effectiveness of behavior reports, a before and after analysis is used. The analysis looks at drivers with reports from January 1997 through October 31, 1999. Incidents for exactly one year prior to and one year after the issuance of a report are analyzed. Drivers are categorized based on age and gender for comparison purposes. A driver's age is based on the date of the report. Drivers with multiple behavior reports are excluded from the analysis, with one exception. If a driver has two reports that were recorded within 30 days of each other, he or she is included in the analysis.¹⁷ The date of the second report is used as the point of reference. The analysis is limited to drivers with Class D regular licenses. Only drivers who have renewed since January 1, 1997 are included. All drivers who are deceased are excluded to avoid biasing the "after" results. The total number of crashes per driver and the total number of citations per driver are analyzed separately. F-statistics and t-ratios are calculated to test for significance. Results are discussed in the following section.

VII. Results and Discussion

Eight-Year Renewal Cycle

Tables 2 and 3, respectively, compare the number of crashes and citations per driver among the three groups of drivers described earlier. For comparability, only data for renewals since January 1, 2000 are included. Test statistics in bold indicate statistical significance. For the group population as a whole, drivers who renewed in person but were eligible to renew by

¹⁶ Number of licensed drivers reported in *1998 Wisconsin Traffic Crash Facts*, Wisconsin Department of Transportation, (1999): 2.

¹⁷ Multiple reports within a 30-day period are likely the result of the same incident or condition.

mail have experienced significantly more crashes and citations per driver since their last renewal than those who renewed by mail. Drivers who were required to renew in person had significantly more crashes and citation per driver than did drivers in both of the other groups. A comparison of monthly crash rates (Table 4) and monthly citation rates (Table 5) shows similar results when focusing on the entire population of drivers. Because these comparisons involve rates, it is not necessary to restrict the time period for group 3. Thus data for all renewals since program inception, February 1998, are included. The overall results seem to contradict the theory that extending the renewal period by at least one additional year will increase the incidence of crashes and citations. At an aggregate level, drivers who renewed in person after four years are incurring more crashes and citations than those who renewed by mail. These results are statistically significant.

For individual categories of drivers, the overall population trends do not always hold. In comparing group 1 and group 2 drivers, many categories of group 2 drivers do not have significantly more crashes per driver or higher monthly crash rates. Crashes per driver among group 2 drivers are only significantly higher than those among group 1 drivers in four of the male categories (35-39, 45-49, 50-54, and 65-69), and one of the female categories (55-59). In fact, two of the group 2 female categories exhibited fewer crashes than corresponding drivers in group 1, but not significantly so. In the monthly crash rate analysis, group 2 rates were higher than group 1 rates for only males in the ages 45-49 category, and females in the 55-59 category. There were more crashes per driver and higher monthly crash rates among group 3 categories than found among corresponding group 1 categories in most cases. In comparing group 3 drivers to group 2 drivers however, there were significantly more crashes per driver among group 3 drivers in only six of the ten male, and two of the female categories. Group 3 monthly crash rates were higher than those among group 2 in only four male categories, and three female categories.

Individual category comparisons matched aggregate comparisons more consistently with respect to citations. The number of citations per driver among group 2 drivers were significantly higher than those found among group 1 in all but three cases. Monthly citation rates were significantly higher in all but six categories. Both the number of citations per driver and monthly citation rates were significantly higher among group 3 categories than corresponding group 1 categories in all but one category case. Comparisons between groups 2 and 3 yield more mixed results. In seven of the twenty age and gender categories, citations per driver for group 3 were not significantly higher than those estimated for group 2. There were significant differences in monthly citation rates in all but four categories.

To gain a better understanding of these results and the underlying differences among the three groups, monthly crash and citation rates for each of the groups from before drivers' most recent renewals are compared in Tables 6 and 7. These tables show that prior to their last renewals, the overall crash and citation rates for group 1 drivers were significantly lower than drivers in the other two groups. This suggests that other factors may differentiate the three groups. It is not surprising that rates for group 3 drivers were higher than those for both of the other groups since driving history was used to determine who was required to renew in person. This result holds consistently for every category of driver. The fact that historical crash and citation rates are higher for group 2 drivers than group 1 drivers is surprising. Since both groups

were eligible to renew by mail, it was expected that they had similar driving histories. However, this analysis indicates that in many cases they did not. Self-selection bias may indeed be an issue. With respect to citations, group 2 drivers in every category of drivers except females 65-69 had significantly higher monthly rates than group 1 drivers prior to their last renewal. For crashes, the rates were significantly higher for male drivers in group 2 for each age group under 50 and for the 55-59 year olds. For females, group 2 drivers had significantly higher crash rates for each category except 45-49, 50-54, 60-64, and 65-69.

The before and after analysis provides a means of evaluating the impacts of the longer renewal cycle without the issue of differences between comparison groups. Here monthly crash and monthly citation rates are examined for the same group of drivers for a period of time prior to their last renewals compared to a period of time after their last renewals. Rates are examined separately for each group. Table 8 shows the before and after comparison of monthly crash rates for group 1 drivers. A similar comparison of citation rates is presented in Table 9. Crash rates are significantly higher for all driver categories, except males ages 25-34, after renewal by mail than rates for these same drivers prior to renewal. Aggregate crash rates have increased over 50 percent. This is true in spite of the fact that the “after” time period excludes any crash data for November and December, months when crashes tend to be more frequent because of the weather. Thus the preliminary data seem to suggest that a longer renewal period may indeed increase the incidence of crashes. The results are not quite as clear with respect to citation rates. While overall citation rates have increased 8 percent, only one-fourth of the driver categories had significantly higher rates after renewing by mail.

The same type of comparison using drivers in the remaining two groups can be beneficial in determining whether the results observed for group 1 drivers are the result of being seen less frequently by DMV examiners or by other external factors. Tables 10 and 11 pertain to drivers who renewed in person, but were eligible for renewal by mail. In the aggregate, crash rates are significantly higher since last renewal (nearly 50 percent), but citation rates are not. Within age and gender categories, crash rates in six of ten male, and four of ten female, categories have significantly risen. Citation rates are higher only for males 19-24 and 25-29, and females 40-44.

Tables 12 and 13 compare monthly crash and citation rates for group 3 drivers from before their last renewal to after their last renewal. Unlike results for the other two groups, in most instances crash and citation rates are actually lower in the latter period of time. Overall, monthly crash rates declined 24 percent and monthly citation rates fell 22 percent. Older drivers are the exception, with differences in their crash and citations rates not differing significantly over time.

In summary, preliminary results from the before and after analysis show an increase in monthly crash rates for groups 1 and 2 drivers and a decline for group 3 drivers. Monthly citations increased significantly in group 1, were not significantly different among group 2 drivers, and significantly declined for group 3. Although the group 1 analysis provides some evidence that a longer renewal period may increase the number of traffic incidences, it is difficult to draw any strong conclusions in light of the results observed for groups 2 and 3. Updating the analysis over time should provide more definitive results.

Table 2: Comparison of Crashes per Driver Since Last Renewal Among the 3 Groups

Description	Group 1 Renewal by Mail (since January 1, 2000)			Group 2 In-Person Renewal by Choice (since January 1, 2000)			Group 3 In-Person Renewal Required (since January 1, 2000)			Group 1 vs Group 2		Group 1 vs Group 3		Group 2 vs Group 3	
	Drivers	Crashes	Crashes/ Driver	Drivers	Crashes	Crashes/ Driver	Drivers	Crashes	Crashes/ Driver	F-STAT	T-Ratio	F-STAT	T-Ratio	F-STAT	T-Ratio
Males 19-24	1,487	51	0.0343	2,157	85	0.0394	28,024	1,790	0.0639	0.61	0.78	19.1	4.37	18.6	4.31
Males 25-29	2,173	54	0.0249	2,273	79	0.0348	15,055	682	0.0453	3.53	1.88	18.6	4.31	5.0	2.23
Males 30-34	4,064	86	0.0212	3,028	83	0.0274	13,797	569	0.0412	2.74	1.65	33.6	5.80	12.1	3.48
Males 35-39	11,344	236	0.0208	2,803	78	0.0278	12,464	546	0.0438	4.82	2.20	92.7	9.63	13.7	3.70
Males 40-44	10,283	224	0.0218	2,029	49	0.0241	10,472	414	0.0395	0.40	0.63	51.1	7.15	10.4	3.23
Males 45-49	12,955	260	0.0201	1,579	48	0.0304	7,942	266	0.0335	6.97	2.64	34.3	5.86	0.4	0.61
Males 50-54	10,784	224	0.0208	1,183	38	0.0321	5,691	180	0.0316	5.90	2.43	17.1	4.13	0.0	-0.09
Males 55-59	9,232	175	0.0190	718	14	0.0195	3,660	135	0.0369	0.01	0.09	33.6	5.80	5.0	2.23
Males 60-64	6,855	120	0.0175	520	14	0.0269	2,451	79	0.0322	2.36	1.54	17.9	4.24	0.4	0.61
Males 65-69	6,367	117	0.0184	316	11	0.0348	2,869	65	0.0227	4.12	2.03	1.9	1.36	1.7	-1.32
Males 70-74	-	-	-	-	-	-	8,982	176	0.0196	-	-	-	-	-	-
Males 75-79	-	-	-	-	-	-	5,613	133	0.0237	-	-	-	-	-	-
Males 80-84	-	-	-	-	-	-	3,048	71	0.0233	-	-	-	-	-	-
Males 85-89	-	-	-	-	-	-	1,075	38	0.0353	-	-	-	-	-	-
Males 90+	-	-	-	-	-	-	226	5	0.0221	-	-	-	-	-	-
Females 19-24	1,346	47	0.0349	2,818	71	0.0252	28,948	1,188	0.0410	2.96	-1.72	1.2	1.08	16.0	3.99
Females 25-29	2,170	50	0.0230	3,082	84	0.0273	15,933	495	0.0311	0.93	0.97	4.0	1.99	1.2	1.09
Females 30-34	5,399	114	0.0211	3,711	82	0.0221	12,735	358	0.0281	0.10	0.32	6.9	2.62	3.7	1.93
Females 35-39	15,354	262	0.0171	3,249	62	0.0191	11,642	295	0.0253	0.61	0.78	21.7	4.65	4.1	2.02
Females 40-44	13,332	231	0.0173	2,516	56	0.0223	9,426	243	0.0258	2.96	1.72	19.2	4.39	1.0	0.98
Females 45-49	15,560	260	0.0167	1,805	40	0.0222	6,772	181	0.0267	2.75	1.66	23.2	4.82	1.1	1.03
Females 50-54	12,886	209	0.0162	1,236	24	0.0194	4,694	105	0.0224	0.68	0.83	7.2	2.69	0.4	0.63
Females 55-59	10,915	152	0.0139	716	17	0.0237	2,942	55	0.0187	4.40	2.10	3.5	1.88	0.7	-0.83
Females 60-64	8,577	95	0.0111	543	10	0.0184	1,973	37	0.0188	2.30	1.52	7.4	2.71	0.0	0.06
Females 65-69	7,817	110	0.0141	358	5	0.0140	2,891	55	0.0190	0.00	-0.02	3.1	1.77	0.4	0.62
Females 70-74	-	-	-	-	-	-	9,343	137	0.0147	-	-	-	-	-	-
Females 75-79	-	-	-	-	-	-	6,881	110	0.0160	-	-	-	-	-	-
Females 80-84	-	-	-	-	-	-	3,774	80	0.0212	-	-	-	-	-	-
Females 85-89	-	-	-	-	-	-	1,294	37	0.0286	-	-	-	-	-	-
Females 90+	-	-	-	-	-	-	212	6	0.0283	-	-	-	-	-	-
Total	168,900	3,077	0.0182	36,640	950	0.0259	240,829	8,531	0.0354	66.45	8.15	1,007.9	31.75	91.3	9.56

*Bold indicates statistical significance at 95%

Table 3: Comparison of Citations per Driver Since Last Renewal Among the 3 Groups

Description	Group 1 Renewal by Mail (since January 1, 2000)			Group 2 In-Person Renewal by Choice (since January 1, 2000)			Group 3 In-Person Renewal Required (since January 1, 2000)			Group 1 vs Group 2		Group 1 vs Group 3		Group 2 vs Group 3	
	Drivers	Citations	Citations/ Driver	Drivers	Citations	Citations/ Driver	Drivers	Citations	Citations/ Driver	F-STAT	T-Ratio	F-STAT	T-Ratio	F-STAT	T-Ratio
Males 19-24	1,487	156	0.1049	2,157	288	0.1335	28,024	10,754	0.3837	4.38	2.09	159.6	12.63	184.5	13.58
Males 25-29	2,173	152	0.0699	2,273	275	0.1210	15,055	3,773	0.2506	23.06	4.80	167.0	12.92	87.6	9.36
Males 30-34	4,064	266	0.0655	3,028	232	0.0766	13,797	2,494	0.1808	2.47	1.57	168.0	12.96	103.1	10.16
Males 35-39	11,344	520	0.0458	2,803	210	0.0749	12,464	2,045	0.1641	28.27	5.32	474.8	21.79	74.9	8.65
Males 40-44	10,283	443	0.0431	2,029	122	0.0601	10,472	1,489	0.1422	9.04	3.01	353.5	18.80	54.6	7.39
Males 45-49	12,955	485	0.0374	1,579	103	0.0652	7,942	820	0.1032	22.61	4.75	241.0	15.52	12.9	3.59
Males 50-54	10,784	396	0.0367	1,183	73	0.0617	5,691	469	0.0824	13.61	3.69	106.6	10.33	3.6	1.89
Males 55-59	9,232	249	0.0270	718	30	0.0418	3,660	317	0.0866	4.44	2.11	153.1	12.37	9.9	3.14
Males 60-64	6,855	176	0.0257	520	23	0.0442	2,451	147	0.0600	5.56	2.36	54.6	7.39	1.7	1.29
Males 65-69	6,367	141	0.0221	316	13	0.0411	2,869	92	0.0321	4.47	2.11	6.7	2.60	0.5	-0.72
Males 70-74	-	-	-	-	-	-	8,982	201	0.0224	-	-	-	-	-	-
Males 75-79	-	-	-	-	-	-	5,613	122	0.0217	-	-	-	-	-	-
Males 80-84	-	-	-	-	-	-	3,048	60	0.0197	-	-	-	-	-	-
Males 85-89	-	-	-	-	-	-	1,075	27	0.0251	-	-	-	-	-	-
Males 90+	-	-	-	-	-	-	226	6	0.0265	-	-	-	-	-	-
Females 19-24	1,346	68	0.0505	2,818	208	0.0738	28,948	5,100	0.1762	6.66	2.58	75.4	8.68	102.7	10.14
Females 25-29	2,170	96	0.0442	3,082	189	0.0613	15,933	1,965	0.1233	5.16	2.27	68.7	8.29	57.3	7.57
Females 30-34	5,399	209	0.0387	3,711	171	0.0461	12,735	1,321	0.1037	2.45	1.56	126.1	11.23	69.2	8.32
Females 35-39	15,354	499	0.0325	3,249	162	0.0499	11,642	1,107	0.0951	19.24	4.39	309.0	17.58	40.4	6.35
Females 40-44	13,332	358	0.0269	2,516	134	0.0533	9,426	746	0.0791	42.41	6.51	226.5	15.05	12.4	3.52
Females 45-49	15,560	342	0.0220	1,805	81	0.0449	6,772	373	0.0551	30.31	5.51	129.6	11.38	2.1	1.46
Females 50-54	12,886	277	0.0215	1,236	39	0.0316	4,694	227	0.0484	4.68	2.16	73.3	8.56	4.9	2.21
Females 55-59	10,915	197	0.0180	716	28	0.0391	2,942	131	0.0445	13.16	3.63	59.2	7.70	0.3	0.57
Females 60-64	8,577	110	0.0128	543	7	0.0129	1,973	54	0.0274	0.00	0.02	19.7	4.44	3.2	1.78
Females 65-69	7,817	97	0.0124	358	7	0.0196	2,891	43	0.0149	1.24	1.12	0.9	0.96	0.4	-0.67
Females 70-74	-	-	-	-	-	-	9,343	113	0.0121	-	-	-	-	-	-
Females 75-79	-	-	-	-	-	-	6,881	83	0.0121	-	-	-	-	-	-
Females 80-84	-	-	-	-	-	-	3,774	45	0.0119	-	-	-	-	-	-
Females 85-89	-	-	-	-	-	-	1,294	15	0.0116	-	-	-	-	-	-
Females 90+	-	-	-	-	-	-	212	1	0.0047	-	-	-	-	-	-
Total	168,900	5,237	0.0310	36,640	2,395	0.0654	240,829	34,140	0.1418	695.71	26.38	7,565.3	86.98	794.0	28.18

*Bold indicates statistical significance at 95%

Table 4: Comparison of Monthly Crash Rates Since Last Renewal Among the 3 Groups

Description	Group 1 Renewal by Mail (since January 1, 2000)			Group 2 In-Person Renewal by Choice (since January 1, 2000)			Group 3 In-Person Renewal Required (since February 1, 1998)			Group 1 vs Group 2		Group 1 vs Group 3		Group 2 vs Group 3	
	Drivers	Monthly Crash Rates		Drivers	Monthly Crash Rates		Drivers	Monthly Crash Rates		F-STAT	T-Ratio	F-STAT	T-Ratio	F-STAT	T-Ratio
Males 19-24	1,487	0.0050		2,157	0.0054		112,405	0.0077		0.26	0.51	16.0	4.01	15.8	3.98
Males 25-29	2,173	0.0036		2,273	0.0050		76,708	0.0056		3.46	1.86	19.8	4.44	1.7	1.31
Males 30-34	4,064	0.0030		3,028	0.0039		74,853	0.0052		2.54	1.59	43.0	6.55	11.3	3.36
Males 35-39	11,344	0.0030		2,803	0.0038		68,998	0.0052		2.95	1.72	111.5	10.56	12.4	3.52
Males 40-44	10,283	0.0031		2,029	0.0034		57,522	0.0048		0.41	0.64	62.5	7.91	9.2	3.03
Males 45-49	12,955	0.0030		1,579	0.0044		43,882	0.0045		5.73	2.39	65.1	8.07	0.1	0.29
Males 50-54	10,784	0.0030		1,183	0.0043		32,283	0.0041		3.46	1.86	30.7	5.54	0.0	-0.19
Males 55-59	9,232	0.0028		718	0.0030		20,711	0.0041		0.06	0.25	32.6	5.71	2.7	1.65
Males 60-64	6,855	0.0025		520	0.0034		15,186	0.0040		1.20	1.10	32.0	5.65	0.4	0.67
Males 65-69	6,367	0.0025		316	0.0045		17,010	0.0034		3.05	1.75	13.1	3.62	1.5	-1.23
Males 70-74	-	-		-	-		39,272	0.0030		-	-	-	-	-	-
Males 75-79	-	-		-	-		27,602	0.0034		-	-	-	-	-	-
Males 80-84	-	-		-	-		14,938	0.0035		-	-	-	-	-	-
Males 85-89	-	-		-	-		5,097	0.0041		-	-	-	-	-	-
Males 90+	-	-		-	-		989	0.0029		-	-	-	-	-	-
Females 19-24	1,346	0.0048		2,818	0.0035		120,630	0.0054		2.91	-1.71	0.9	0.95	22.0	4.69
Females 25-29	2,170	0.0035		3,082	0.0039		84,840	0.0042		0.32	0.57	2.6	1.63	0.6	0.77
Females 30-34	5,399	0.0031		3,711	0.0032		75,376	0.0040		0.06	0.24	13.6	3.69	7.4	2.72
Females 35-39	15,354	0.0024		3,249	0.0027		68,867	0.0039		0.97	0.98	95.1	9.75	13.7	3.70
Females 40-44	13,332	0.0025		2,516	0.0031		55,987	0.0037		2.47	1.57	53.3	7.30	2.4	1.54
Females 45-49	15,560	0.0024		1,805	0.0030		40,996	0.0036		1.33	1.16	49.4	7.03	2.1	1.44
Females 50-54	12,886	0.0023		1,236	0.0025		29,170	0.0031		0.15	0.39	18.8	4.33	1.4	1.20
Females 55-59	10,915	0.0020		716	0.0035		18,761	0.0028		4.89	2.21	20.5	4.52	1.5	-1.22
Females 60-64	8,577	0.0016		543	0.0023		12,904	0.0025		0.82	0.91	16.8	4.10	0.1	0.30
Females 65-69	7,817	0.0020		358	0.0023		17,278	0.0023		0.06	0.25	1.3	1.14	0.0	-0.01
Females 70-74	-	-		-	-		44,098	0.0020		-	-	-	-	-	-
Females 75-79	-	-		-	-		32,705	0.0023		-	-	-	-	-	-
Females 80-84	-	-		-	-		18,247	0.0027		-	-	-	-	-	-
Females 85-89	-	-		-	-		6,053	0.0031		-	-	-	-	-	-
Females 90+	-	-		-	-		862	0.0035		-	-	-	-	-	-
Total	168,900	0.0026		36,640	0.0036		1,234,230	0.0045		73.64	8.58	1,392.1	37.31	66.3	8.14

*Bold indicates statistical significance at 95%

Table 5: Comparison of Monthly Citation Rates Since Last Renewal Among the 3 Groups

Description	Group 1 Renewal by Mail (since January 1, 2000)			Group 2 In-Person Renewal by Choice (since January 1, 2000)			Group 3 In-Person Renewal Required (since February 1, 1998)			Group 1 vs Group 2		Group 1 vs Group 3		Group 2 vs Group 3	
	Drivers	Monthly Citation Rates		Drivers	Monthly Citation Rates		Drivers	Monthly Citation Rates		F-STAT	T-Ratio	F-STAT	T-Ratio	F-STAT	T-Ratio
Males 19-24	1,487	0.0148		2,157	0.0192		112,405	0.0446		4.99	2.23	160.8	12.68	168.6	12.98
Males 25-29	2,173	0.0098		2,273	0.0171		76,708	0.0280		21.97	4.69	171.5	13.10	64.1	8.01
Males 30-34	4,064	0.0095		3,028	0.0108		74,853	0.0224		1.59	1.26	202.3	14.22	122.0	11.04
Males 35-39	11,344	0.0066		2,803	0.0102		68,998	0.0198		21.39	4.63	658.1	25.65	89.4	9.45
Males 40-44	10,283	0.0061		2,029	0.0082		57,522	0.0167		6.56	2.56	468.1	21.63	62.9	7.93
Males 45-49	12,955	0.0054		1,579	0.0087		43,882	0.0139		15.25	3.90	449.8	21.21	23.0	4.79
Males 50-54	10,784	0.0051		1,183	0.0084		32,283	0.0115		11.77	3.43	257.6	16.05	7.6	2.76
Males 55-59	9,232	0.0039		718	0.0057		20,711	0.0099		3.08	1.75	220.0	14.83	10.0	3.16
Males 60-64	6,855	0.0035		520	0.0060		15,186	0.0075		5.17	2.27	109.0	10.44	1.5	1.23
Males 65-69	6,367	0.0032		316	0.0050		17,010	0.0048		1.73	1.32	23.3	4.83	0.0	-0.17
Males 70-74	-	-		-	-		39,272	0.0031		-	-	-	-	-	-
Males 75-79	-	-		-	-		27,602	0.0029		-	-	-	-	-	-
Males 80-84	-	-		-	-		14,938	0.0028		-	-	-	-	-	-
Males 85-89	-	-		-	-		5,097	0.0029		-	-	-	-	-	-
Males 90+	-	-		-	-		989	0.0025		-	-	-	-	-	-
Females 19-24	1,346	0.0071		2,818	0.0103		120,630	0.0213		5.94	2.44	86.1	9.28	107.1	10.35
Females 25-29	2,170	0.0064		3,082	0.0086		84,840	0.0150		3.96	1.99	79.4	8.91	62.2	7.88
Females 30-34	5,399	0.0057		3,711	0.0065		75,376	0.0128		1.36	1.17	170.0	13.04	92.4	9.61
Females 35-39	15,354	0.0046		3,249	0.0072		68,867	0.0116		19.11	4.37	475.1	21.80	43.2	6.57
Females 40-44	13,332	0.0038		2,516	0.0074		55,987	0.0098		37.23	6.10	344.9	18.57	10.7	3.27
Females 45-49	15,560	0.0031		1,805	0.0063		40,996	0.0079		28.82	5.37	356.5	18.88	5.1	2.25
Females 50-54	12,886	0.0030		1,236	0.0048		29,170	0.0067		7.29	2.70	194.5	13.95	5.9	2.43
Females 55-59	10,915	0.0026		716	0.0057		18,761	0.0053		12.27	3.50	103.4	10.17	0.2	-0.47
Females 60-64	8,577	0.0019		543	0.0016		12,904	0.0036		0.13	-0.35	45.5	6.75	6.6	2.58
Females 65-69	7,817	0.0018		358	0.0032		17,278	0.0021		1.96	1.40	3.4	1.85	2.0	-1.41
Females 70-74	-	-		-	-		44,098	0.0016		-	-	-	-	-	-
Females 75-79	-	-		-	-		32,705	0.0017		-	-	-	-	-	-
Females 80-84	-	-		-	-		18,247	0.0017		-	-	-	-	-	-
Females 85-89	-	-		-	-		6,053	0.0018		-	-	-	-	-	-
Females 90+	-	-		-	-		862	0.0013		-	-	-	-	-	-
Total	168,900	0.0044		36,640	0.0092		1,234,230	0.0161		709.10	26.63	8,808.9	93.86	684.8	26.17

*Bold indicates statistical significance at 95%

Table 6: Comparison of Monthly Crash Rates Prior to Last Renewal Among the 3 Groups

Description	Group 1 Renewal by Mail (Jan 1996-Dec 1999)			Group 2 In-Person Renewal by Choice (Jan 1996-Dec 1999)			Group 3 In-Person Renewal Required (Jan 1996-Jan 1998)			Group 1 vs Group 2		Group 1 vs Group 3		Group 2 vs Group 3	
	Drivers	Monthly Crash Rates		Drivers	Monthly Crash Rates		Drivers	Monthly Crash Rates		F-STAT	T-Ratio	F-STAT	T-Ratio	F-STAT	T-Ratio
Males 19-24	1,487	0.0027		2,157	0.0033		112,405	0.0094		5.83	2.42	251.2	15.85	301.7	17.37
Males 25-29	2,173	0.0026		2,273	0.0031		76,708	0.0063		6.49	2.55	164.9	12.84	125.3	11.19
Males 30-34	4,064	0.0023		3,028	0.0031		74,853	0.0060		18.63	4.32	313.8	17.71	152.3	12.34
Males 35-39	11,344	0.0023		2,803	0.0026		68,998	0.0061		6.56	2.56	918.8	30.31	192.7	13.88
Males 40-44	10,283	0.0020		2,029	0.0024		57,522	0.0064		6.80	2.61	1,072.6	32.75	181.0	13.46
Males 45-49	12,955	0.0021		1,579	0.0023		43,882	0.0066		1.21	1.10	1,346.7	36.70	159.1	12.61
Males 50-54	10,784	0.0020		1,183	0.0021		32,283	0.0069		0.96	0.98	1,274.3	35.70	136.8	11.70
Males 55-59	9,232	0.0018		718	0.0023		20,711	0.0069		4.91	2.22	1,162.7	34.10	78.5	8.86
Males 60-64	6,855	0.0017		520	0.0019		15,186	0.0074		0.76	0.87	1,012.4	31.82	75.2	8.67
Males 65-69	6,367	0.0016		316	0.0020		17,010	0.0057		1.46	1.21	633.0	25.16	27.5	5.25
Males 70-74	-	-		-	-		39,272	0.0029		-	-	-	-	-	-
Males 75-79	-	-		-	-		27,602	0.0032		-	-	-	-	-	-
Males 80-84	-	-		-	-		14,938	0.0035		-	-	-	-	-	-
Males 85-89	-	-		-	-		5,097	0.0037		-	-	-	-	-	-
Males 90+	-	-		-	-		989	0.0040		-	-	-	-	-	-
Females 19-24	1,346	0.0021		2,818	0.0030		120,630	0.0072		15.16	3.89	181.5	13.47	258.7	16.08
Females 25-29	2,170	0.0020		3,082	0.0024		84,840	0.0052		6.60	2.57	158.9	12.61	166.4	12.90
Females 30-34	5,399	0.0018		3,711	0.0022		75,376	0.0053		10.51	3.24	434.3	20.84	231.8	15.23
Females 35-39	15,354	0.0018		3,249	0.0021		68,867	0.0055		7.50	2.74	1,322.7	36.37	244.0	15.62
Females 40-44	13,332	0.0016		2,516	0.0021		55,987	0.0058		16.87	4.11	1,431.1	37.83	217.5	14.75
Females 45-49	15,560	0.0016		1,805	0.0018		40,996	0.0058		3.43	1.85	1,673.8	40.91	182.2	13.50
Females 50-54	12,886	0.0015		1,236	0.0018		29,170	0.0059		3.83	1.96	1,473.8	38.39	130.6	11.43
Females 55-59	10,915	0.0014		716	0.0020		18,761	0.0061		11.96	3.46	1,340.4	36.61	69.5	8.34
Females 60-64	8,577	0.0011		543	0.0012		12,904	0.0060		0.04	0.19	1,185.5	34.43	79.8	8.93
Females 65-69	7,817	0.0010		358	0.0013		17,278	0.0036		1.22	1.11	481.9	21.95	19.3	4.39
Females 70-74	-	-		-	-		44,098	0.0019		-	-	-	-	-	-
Females 75-79	-	-		-	-		32,705	0.0022		-	-	-	-	-	-
Females 80-84	-	-		-	-		18,247	0.0024		-	-	-	-	-	-
Females 85-89	-	-		-	-		6,053	0.0026		-	-	-	-	-	-
Females 90+	-	-		-	-		862	0.0026		-	-	-	-	-	-
Total	168,900	0.0017		36,640	0.0024		1,234,230	0.0059		427.10	20.67	16,721.1	129.31	2,550.6	50.50

*Bold indicates statistical significance at 95%

Table 7: Comparison of Monthly Citation Rates Prior to Last Renewal Among the 3 Groups

Description	Group 1 Renewal by Mail (Jan 1996-Dec 1999)		Group 2 In-Person Renewal by Choice (Jan 1996-Dec 1999)		Group 3 In-Person Renewal Required (Jan 1996-Jan 1998)		Group 1 vs Group 2		Group 1 vs Group 3		Group 2 vs Group 3	
	Drivers	Monthly Citation Rates	Drivers	Monthly Citation Rates	Drivers	Monthly Citation Rates	F-STAT	T-Ratio	F-STAT	T-Ratio	F-STAT	T-Ratio
Males 19-24	1,487	0.0105	2,157	0.0161	112,405	0.0505	70.86	8.42	584.0	24.17	625.1	25.00
Males 25-29	2,173	0.0095	2,273	0.0139	76,708	0.0376	65.91	8.12	560.8	23.68	418.2	20.45
Males 30-34	4,064	0.0079	3,028	0.0111	74,853	0.0289	71.10	8.43	814.2	28.53	436.7	20.90
Males 35-39	11,344	0.0065	2,803	0.0103	68,998	0.0265	169.06	13.00	2,341.1	48.38	382.8	19.57
Males 40-44	10,283	0.0057	2,029	0.0096	57,522	0.0225	153.97	12.41	1,897.3	43.56	221.7	14.89
Males 45-49	12,955	0.0049	1,579	0.0084	43,882	0.0202	125.31	11.19	2,261.9	47.56	168.5	12.98
Males 50-54	10,784	0.0045	1,183	0.0074	32,283	0.0172	76.87	8.77	1,604.5	40.06	107.2	10.35
Males 55-59	9,232	0.0040	718	0.0067	20,711	0.0154	46.78	6.84	1,266.2	35.58	60.2	7.76
Males 60-64	6,855	0.0036	520	0.0051	15,186	0.0123	11.30	3.36	773.6	27.81	42.8	6.54
Males 65-69	6,367	0.0029	316	0.0047	17,010	0.0077	12.79	3.58	355.8	18.86	7.5	2.74
Males 70-74	-	-	-	-	39,272	0.0036	-	-	-	-	-	-
Males 75-79	-	-	-	-	27,602	0.0031	-	-	-	-	-	-
Males 80-84	-	-	-	-	14,938	0.0029	-	-	-	-	-	-
Males 85-89	-	-	-	-	5,097	0.0029	-	-	-	-	-	-
Males 90+	-	-	-	-	989	0.0031	-	-	-	-	-	-
Females 19-24	1,346	0.0068	2,818	0.0105	120,630	0.0257	56.59	7.52	294.2	17.15	398.8	19.97
Females 25-29	2,170	0.0056	3,082	0.0090	84,840	0.0199	75.11	8.67	322.6	17.96	266.7	16.33
Females 30-34	5,399	0.0046	3,711	0.0070	75,376	0.0166	88.68	9.42	742.0	27.24	326.9	18.08
Females 35-39	15,354	0.0041	3,249	0.0070	68,867	0.0154	203.42	14.26	2,017.0	44.91	239.2	15.47
Females 40-44	13,332	0.0037	2,516	0.0058	55,987	0.0133	101.28	10.06	1,564.5	39.55	182.0	13.49
Females 45-49	15,560	0.0032	1,805	0.0050	40,996	0.0113	67.00	8.19	1,626.3	40.33	117.5	10.84
Females 50-54	12,886	0.0029	1,236	0.0056	29,170	0.0096	109.14	10.45	1,161.7	34.08	42.2	6.50
Females 55-59	10,915	0.0024	716	0.0036	18,761	0.0079	18.31	4.28	849.2	29.14	36.3	6.02
Females 60-64	8,577	0.0019	543	0.0030	12,904	0.0060	16.81	4.10	532.3	23.07	18.9	4.35
Females 65-69	7,817	0.0014	358	0.0018	17,278	0.0033	2.00	1.41	197.0	14.04	5.9	2.44
Females 70-74	-	-	-	-	44,098	0.0016	-	-	-	-	-	-
Females 75-79	-	-	-	-	32,705	0.0016	-	-	-	-	-	-
Females 80-84	-	-	-	-	18,247	0.0017	-	-	-	-	-	-
Females 85-89	-	-	-	-	6,053	0.0017	-	-	-	-	-	-
Females 90+	-	-	-	-	862	0.0018	-	-	-	-	-	-
Total	168,900	0.0041	36,640	0.0087	1,234,230	0.0205	5,103.00	71.44	27,828.8	166.82	3,104.5	55.72

*Bold indicates statistical significance at 95%

Table 8: Group 1, Renewal by Mail, Monthly Crash Rates Before and After Last Renewal,
(Crashes Occurring from January 1, 1996 through October 31, 2000)

Description	Before Renewal by Mail		After Renewal by Mail		Before vs. After RBM	
	Drivers	Monthly Crash Rates	Drivers	Monthly Crash Rates	F-STAT	T-Ratio
Males 19-24	1,487	0.0027	1,487	0.0050	9.6	3.10
Males 25-29	2,173	0.0026	2,173	0.0036	3.4	1.84
Males 30-34	4,064	0.0023	4,064	0.0030	3.7	1.92
Males 35-39	11,344	0.0023	11,344	0.0030	11.5	3.39
Males 40-44	10,283	0.0020	10,283	0.0031	25.5	5.05
Males 45-49	12,955	0.0021	12,955	0.0030	18.5	4.30
Males 50-54	10,784	0.0020	10,784	0.0030	22.4	4.74
Males 55-59	9,232	0.0018	9,232	0.0028	18.6	4.32
Males 60-64	6,855	0.0017	6,855	0.0025	10.1	3.18
Males 65-69	6,367	0.0016	6,367	0.0025	12.7	3.56
Females 19-24	1,346	0.0021	1,346	0.0048	14.2	3.77
Females 25-29	2,170	0.0020	2,170	0.0035	8.6	2.94
Females 30-34	5,399	0.0018	5,399	0.0031	16.8	4.09
Females 35-39	15,354	0.0018	15,354	0.0024	15.1	3.89
Females 40-44	13,332	0.0016	13,332	0.0025	26.5	5.15
Females 45-49	15,560	0.0016	15,560	0.0024	27.7	5.26
Females 50-54	12,886	0.0015	12,886	0.0023	22.9	4.78
Females 55-59	10,915	0.0014	10,915	0.0020	13.1	3.62
Females 60-64	8,577	0.0011	8,577	0.0016	8.1	2.85
Females 65-69	7,817	0.0010	7,817	0.0020	23.7	4.87
Total	168,900	0.0017	168,900	0.0026	298.8	17.29

*Bold indicates statistical significance at 95%

Table 9: Group 1, Renewal by Mail, Monthly Citation Rates Before and After Last Renewal
(Citations Occurring from January 1, 1996 through October 31, 2000)

Description	Before Renewal by Mail		After Renewal by Mail		Before vs. After RBM	
	Drivers	Monthly Citation Rates	Drivers	Monthly Citation Rates	F-STAT	T-Ratio
Males 19-24	1,487	0.0105	1,487	0.0148	9.3	3.06
Males 25-29	2,173	0.0095	2,173	0.0098	0.1	0.27
Males 30-34	4,064	0.0079	4,064	0.0095	5.4	2.32
Males 35-39	11,344	0.0065	11,344	0.0066	0.0	0.22
Males 40-44	10,283	0.0057	10,283	0.0061	1.7	1.29
Males 45-49	12,955	0.0049	12,955	0.0054	2.6	1.63
Males 50-54	10,784	0.0045	10,784	0.0051	4.6	2.14
Males 55-59	9,232	0.0040	9,232	0.0039	0.1	-0.37
Males 60-64	6,855	0.0036	6,855	0.0035	0.2	-0.41
Males 65-69	6,367	0.0029	6,367	0.0032	1.1	1.05
Females 19-24	1,346	0.0068	1,346	0.0071	0.1	0.32
Females 25-29	2,170	0.0056	2,170	0.0064	1.1	1.05
Females 30-34	5,399	0.0046	5,399	0.0057	5.4	2.33
Females 35-39	15,354	0.0041	15,354	0.0046	5.1	2.25
Females 40-44	13,332	0.0037	13,332	0.0038	0.4	0.63
Females 45-49	15,560	0.0032	15,560	0.0031	0.3	-0.56
Females 50-54	12,886	0.0029	12,886	0.0030	0.4	0.65
Females 55-59	10,915	0.0024	10,915	0.0026	1.0	1.00
Females 60-64	8,577	0.0019	8,577	0.0019	0.1	0.35
Females 65-69	7,817	0.0014	7,817	0.0018	3.0	1.72
Total	168,900	0.0041	168,900	0.0044	21.3	4.62

*Bold indicates statistical significance at 95%

Table 10: Group 2, In-Person Renewal by Choice, Monthly Crash Rates Before and After Last Renewal
(Crashes Occurring from January 1, 1996 through October 31, 2000)

Description	Before Last Renewal		After Last Renewal		Before vs. After RBM	
	Drivers	Monthly Crash Rates	Drivers	Monthly Crash Rates	F-STAT	T-Ratio
Males 19-24	2,157	0.0033	2,157	0.0054	11.7	3.42
Males 25-29	2,273	0.0031	2,273	0.0050	9.3	3.05
Males 30-34	3,028	0.0031	3,028	0.0039	3.6	1.88
Males 35-39	2,803	0.0026	2,803	0.0038	5.9	2.44
Males 40-44	2,029	0.0024	2,029	0.0034	4.2	2.04
Males 45-49	1,579	0.0023	1,579	0.0044	9.6	3.10
Males 50-54	1,183	0.0021	1,183	0.0043	6.9	2.63
Males 55-59	718	0.0023	718	0.0030	0.5	0.71
Males 60-64	520	0.0019	520	0.0034	2.3	1.53
Males 65-69	316	0.0020	316	0.0045	2.7	1.63
Females 19-24	2,818	0.0030	2,818	0.0035	1.3	1.16
Females 25-29	3,082	0.0024	3,082	0.0039	10.8	3.29
Females 30-34	3,711	0.0022	3,711	0.0032	6.3	2.50
Females 35-39	3,249	0.0021	3,249	0.0027	3.1	1.76
Females 40-44	2,516	0.0021	2,516	0.0031	5.5	2.34
Females 45-49	1,805	0.0018	1,805	0.0030	4.9	2.22
Females 50-54	1,236	0.0018	1,236	0.0025	1.8	1.33
Females 55-59	716	0.0020	716	0.0035	2.4	1.56
Females 60-64	543	0.0012	543	0.0023	2.2	1.49
Females 65-69	358	0.0013	358	0.0023	0.8	0.91
Total	36,640	0.0024	36,640	0.0036	88.4	9.40

*Bold indicates statistical significance at 95%

Table 11: Group 2, In-Person Renewal by Choice, Monthly Citation Rates Before and After Last Renewal
(Citations Occurring from January 1, 1996 through October 31, 2000)

Description	Before Last Renewal		After Last Renewal		Before vs. After RBM	
	Drivers	Monthly Citation Rates	Drivers	Monthly Citation Rates	F-STAT	T-Ratio
Males 19-24	2,157	0.0161	2,157	0.0192	4.5	2.11
Males 25-29	2,273	0.0139	2,273	0.0171	6.1	2.46
Males 30-34	3,028	0.0111	3,028	0.0108	0.1	-0.24
Males 35-39	2,803	0.0103	2,803	0.0102	0.0	-0.07
Males 40-44	2,029	0.0096	2,029	0.0082	2.2	-1.48
Males 45-49	1,579	0.0084	1,579	0.0087	0.1	0.30
Males 50-54	1,183	0.0074	1,183	0.0084	0.8	0.87
Males 55-59	718	0.0067	718	0.0057	0.5	-0.67
Males 60-64	520	0.0051	520	0.0060	0.4	0.65
Males 65-69	316	0.0047	316	0.0050	0.0	0.18
Females 19-24	2,818	0.0105	2,818	0.0103	0.0	-0.18
Females 25-29	3,082	0.0090	3,082	0.0086	0.3	-0.50
Females 30-34	3,711	0.0070	3,711	0.0065	0.7	-0.82
Females 35-39	3,249	0.0070	3,249	0.0072	0.1	0.29
Females 40-44	2,516	0.0058	2,516	0.0074	4.5	2.11
Females 45-49	1,805	0.0050	1,805	0.0063	2.4	1.55
Females 50-54	1,236	0.0056	1,236	0.0048	0.7	-0.81
Females 55-59	716	0.0036	716	0.0057	2.2	1.47
Females 60-64	543	0.0030	543	0.0016	3.8	-1.94
Females 65-69	358	0.0018	358	0.0032	1.1	1.04
Total	36,640	0.0087	36,640	0.0092	3.4	1.83

*Bold indicates statistical significance at 95%

Table 12: Group 3, In-Person Renewal Required, Monthly Crash Rates Before and After Last Renewal
(Crashes Occurring from January 1, 1996 through October 31, 2000)

Description	Before Last Renewal		After Last Renewal		Before vs. After RBM	
	Drivers	Monthly Crash Rates	Drivers	Monthly Crash Rates	F-STAT	T-Ratio
Males 19-24	112,405	0.0094	112,405	0.0077	307.7	-17.54
Males 25-29	76,708	0.0063	76,708	0.0056	52.8	-7.26
Males 30-34	74,853	0.0060	74,853	0.0052	86.6	-9.31
Males 35-39	68,998	0.0061	68,998	0.0052	105.5	-10.27
Males 40-44	57,522	0.0064	57,522	0.0048	259.1	-16.10
Males 45-49	43,882	0.0066	43,882	0.0045	346.1	-18.60
Males 50-54	32,283	0.0069	32,283	0.0041	464.2	-21.54
Males 55-59	20,711	0.0069	20,711	0.0041	299.8	-17.32
Males 60-64	15,186	0.0074	15,186	0.0040	348.0	-18.65
Males 65-69	17,010	0.0057	17,010	0.0034	240.7	-15.51
Males 70-74	39,272	0.0029	39,272	0.0030	0.1	0.26
Males 75-79	27,602	0.0032	27,602	0.0034	2.1	1.45
Males 80-84	14,938	0.0035	14,938	0.0035	0.0	-0.03
Males 85-89	5,097	0.0037	5,097	0.0041	2.6	1.62
Males 90+	989	0.0040	989	0.0029	3.6	-1.90
Females 19-24	120,630	0.0072	120,630	0.0054	606.4	-24.63
Females 25-29	84,840	0.0052	84,840	0.0042	191.3	-13.83
Females 30-34	75,376	0.0053	75,376	0.0040	285.5	-16.90
Females 35-39	68,867	0.0055	68,867	0.0039	409.8	-20.24
Females 40-44	55,987	0.0058	55,987	0.0037	588.7	-24.26
Females 45-49	40,996	0.0058	40,996	0.0036	496.9	-22.29
Females 50-54	29,170	0.0059	29,170	0.0031	600.2	-24.50
Females 55-59	18,761	0.0061	18,761	0.0028	533.4	-23.10
Females 60-64	12,904	0.0060	12,904	0.0025	477.9	-21.86
Females 65-69	17,278	0.0036	17,278	0.0023	115.0	-10.73
Females 70-74	44,098	0.0019	44,098	0.0020	2.5	1.57
Females 75-79	32,705	0.0022	32,705	0.0023	2.4	1.55
Females 80-84	18,247	0.0024	18,247	0.0027	5.5	2.35
Females 85-89	6,053	0.0026	6,053	0.0031	4.7	2.16
Females 90+	862	0.0026	862	0.0035	1.5	1.24
Total	1,234,230	0.0059	1,234,230	0.0045	4,387.0	-66.23

*Bold indicates statistical significance at 95%

Table 13: Group 3, In-Person Renewal Required, Monthly Citation Rates Before and After Last Renewal
(Citations Occurring from January 1, 1996 through October 31, 2000)

Description	Before Last Renewal		After Last Renewal		Before vs. After RBM	
	Drivers	Monthly Citation Rates	Drivers	Monthly Citation Rates	F-STAT	T-Ratio
Males 19-24	112,405	0.0505	112,405	0.0446	317.0	-17.80
Males 25-29	76,708	0.0376	76,708	0.0280	966.6	-31.09
Males 30-34	74,853	0.0289	74,853	0.0224	579.1	-24.06
Males 35-39	68,998	0.0265	68,998	0.0198	664.4	-25.78
Males 40-44	57,522	0.0225	57,522	0.0167	521.5	-22.84
Males 45-49	43,882	0.0202	43,882	0.0139	567.2	-23.82
Males 50-54	32,283	0.0172	32,283	0.0115	446.0	-21.12
Males 55-59	20,711	0.0154	20,711	0.0099	303.4	-17.42
Males 60-64	15,186	0.0123	15,186	0.0075	248.3	-15.76
Males 65-69	17,010	0.0077	17,010	0.0048	173.3	-13.17
Males 70-74	39,272	0.0036	39,272	0.0031	17.5	-4.18
Males 75-79	27,602	0.0031	27,602	0.0029	5.1	-2.26
Males 80-84	14,938	0.0029	14,938	0.0028	0.6	-0.77
Males 85-89	5,097	0.0029	5,097	0.0029	0.0	-0.03
Males 90+	989	0.0031	989	0.0025	0.9	-0.97
Females 19-24	120,630	0.0257	120,630	0.0213	479.5	-21.90
Females 25-29	84,840	0.0199	84,840	0.0150	619.5	-24.89
Females 30-34	75,376	0.0166	75,376	0.0128	435.2	-20.86
Females 35-39	68,867	0.0154	68,867	0.0116	432.5	-20.80
Females 40-44	55,987	0.0133	55,987	0.0098	358.6	-18.94
Females 45-49	40,996	0.0113	40,996	0.0079	353.3	-18.80
Females 50-54	29,170	0.0096	29,170	0.0067	220.3	-14.84
Females 55-59	18,761	0.0079	18,761	0.0053	157.8	-12.56
Females 60-64	12,904	0.0060	12,904	0.0036	135.0	-11.62
Females 65-69	17,278	0.0033	17,278	0.0021	78.0	-8.83
Females 70-74	44,098	0.0016	44,098	0.0016	1.2	-1.10
Females 75-79	32,705	0.0016	32,705	0.0017	0.1	0.37
Females 80-84	18,247	0.0017	18,247	0.0017	0.0	0.07
Females 85-89	6,053	0.0017	6,053	0.0018	0.0	0.11
Females 90+	862	0.0018	862	0.0013	1.6	-1.25
Total	1,234,230	0.0205	1,234,230	0.0161	5,836.8	-76.40

*Bold indicates statistical significance at 95%

Driver Condition/Behavior Reports

Crashes per driver for the year prior to receipt of a behavior report and one year after are presented in Table 14. To put the numbers into perspective, the number of crashes per driver in 1997 for drivers with Class D and M regular licenses are also provided.¹⁸ Drivers with reports incurred a much higher incidence of crashes than the population as a whole. When comparing the number of crashes per driver from the year before the report to the year after, the analysis shows a significant reduction in all age and gender categories. Monthly crash rates declined 67 to 96 percent within the individual age and gender categories, and 86 percent overall. It is unknown whether the overall effect is a result of improved driving behavior or simply a cessation in driving. For the purposes of this study, it does not matter. The data overwhelmingly indicate that the use of behavior reports is an effective tool for reducing these types of incidents.

Table 15 shows similar results with respect to citations. Monthly citation rates dropped 66 percent in total. Male drivers in all age categories had a significant decrease in the number of citations per driver in the year after a report was issued. For females, all groups except those 16-19, 20-24, and 50-54 also exhibited significant decreases in citations. Again, the results support the fact that behavior reports are an important tool for the identification of high-risk drivers.

¹⁸ Drivers with Class A, B, or C licenses are excluded as well as drivers under the age of 16, drivers who have not renewed since 1997, and those who are deceased.

Table 14: Crashes per Driver One Year Before and One Year After Behavior Report
(Drivers with Reports from January 1, 1997 through October 31, 1999)

Description	1 Year Before			1 Year After			1997 Overall Crashes per Driver			Before vs. After Behavior Report	
	Drivers	Crashes	Crashes/ Driver	Drivers	Crashes	Crashes/ Driver	Drivers	Crashes	Crashes/ Driver	F-STAT	T-Ratio
Males 16-24	180	111	0.6167	180	32	0.1778	197,175	19,911	0.1010	41.7	-6.46
Males 25-29	107	67	0.6262	107	10	0.0935	120,730	8,106	0.0671	45.9	-6.78
Males 30-34	125	75	0.6000	125	19	0.1520	126,554	7,696	0.0608	38.8	-6.23
Males 35-39	154	96	0.6234	154	12	0.0779	122,332	7,404	0.0605	80.4	-8.97
Males 40-44	145	85	0.5862	145	22	0.1517	111,821	6,371	0.0570	37.2	-6.10
Males 45-49	161	90	0.5590	161	20	0.1242	92,443	5,236	0.0566	43.8	-6.62
Males 50-54	115	65	0.5652	115	12	0.1043	71,732	3,919	0.0546	36.2	-6.01
Males 55-59	133	70	0.5263	133	6	0.0451	49,778	2,647	0.0532	69.0	-8.31
Males 60-64	122	55	0.4508	122	7	0.0574	41,733	2,159	0.0517	46.8	-6.84
Males 65-69	193	95	0.4922	193	19	0.0984	47,893	2,057	0.0429	52.5	-7.25
Males 70-74	275	125	0.4545	275	22	0.0800	54,068	1,923	0.0356	81.0	-9.00
Males 75-79	414	199	0.4807	414	20	0.0483	34,776	1,442	0.0415	162.8	-12.76
Males 80-84	470	180	0.3830	470	24	0.0511	17,257	771	0.0447	124.0	-11.14
Males 85-89	308	138	0.4481	308	7	0.0227	5,099	221	0.0433	139.1	-11.79
Males 90+	120	46	0.3833	120	2	0.0167	803	42	0.0523	50.1	-7.08
Females 16-24	108	71	0.6574	108	12	0.1111	217,570	16,968	0.0780	53.1	-7.28
Females 25-29	53	33	0.6226	53	7	0.1321	132,639	7,207	0.0543	23.2	-4.82
Females 30-34	68	49	0.7206	68	3	0.0441	140,058	7,073	0.0505	54.1	-7.35
Females 35-39	101	48	0.4752	101	16	0.1584	134,825	6,772	0.0502	15.2	-3.90
Females 40-44	92	49	0.5326	92	9	0.0978	120,363	5,765	0.0479	28.8	-5.36
Females 45-49	72	37	0.5139	72	7	0.0972	97,305	4,410	0.0453	27.5	-5.24
Females 50-54	87	35	0.4023	87	7	0.0805	74,772	3,154	0.0422	26.4	-5.14
Females 55-59	59	22	0.3729	59	2	0.0339	53,730	2,199	0.0409	18.1	-4.25
Females 60-64	76	39	0.5132	76	5	0.0658	43,421	1,480	0.0341	38.5	-6.20
Females 65-69	89	41	0.4607	89	3	0.0337	52,215	1,344	0.0257	49.2	-7.02
Females 70-74	200	92	0.4600	200	13	0.0650	60,405	1,440	0.0238	77.8	-8.82
Females 75-79	342	133	0.3889	342	9	0.0263	42,191	1,157	0.0274	139.3	-11.80
Females 80-84	454	178	0.3921	454	13	0.0286	21,320	644	0.0302	177.8	-13.33
Females 85-89	314	131	0.4172	314	7	0.0223	6,045	176	0.0291	135.4	-11.64
Females 90+	75	24	0.3200	75	3	0.0400	685	17	0.0248	18.8	-4.33
Total	5,212	2,479	0.4756	5,212	350	0.0672	2,291,738	129,711	0.0566	1,807.4	-42.51

*Bold indicates statistical significance at 95%

Table 15: Citations per Driver One Year Before and One Year After Behavior Report
(Drivers with Reports from January 1, 1997 through October 31, 1999)

Description	1 Year Before			1 Year After			1997 Overall Citations per Driver			Before vs. After Behavior Report	
	Drivers	Citations	Citations/ Driver	Drivers	Citations	Citations/ Driver	Drivers	Citations	Citations/ Driver	F-STAT	T-Ratio
Males 16-24	180	267	1.4833	180	142	0.7889	197,175	106,070	0.5379	17.5	-4.19
Males 25-29	107	122	1.1402	107	56	0.5234	120,730	43,724	0.3622	10.1	-3.18
Males 30-34	125	134	1.0720	125	63	0.5040	126,554	35,607	0.2814	10.7	-3.28
Males 35-39	154	156	1.0130	154	66	0.4286	122,332	30,065	0.2458	14.8	-3.85
Males 40-44	145	165	1.1379	145	68	0.4690	111,821	21,529	0.1925	11.3	-3.37
Males 45-49	161	118	0.7329	161	52	0.3230	92,443	15,017	0.1624	11.0	-3.32
Males 50-54	115	74	0.6435	115	38	0.3304	71,732	9,728	0.1356	5.5	-2.35
Males 55-59	133	73	0.5489	133	32	0.2406	49,778	5,577	0.1120	10.6	-3.26
Males 60-64	122	67	0.5492	122	19	0.1557	41,733	3,719	0.0891	15.6	-3.95
Males 65-69	193	82	0.4249	193	44	0.2280	47,893	2,779	0.0580	5.7	-2.38
Males 70-74	275	114	0.4145	275	12	0.0436	54,068	2,203	0.0407	63.9	-7.99
Males 75-79	414	189	0.4565	414	45	0.1087	34,776	1,298	0.0373	61.4	-7.84
Males 80-84	470	198	0.4213	470	27	0.0574	17,257	602	0.0349	96.0	-9.80
Males 85-89	308	114	0.3701	308	20	0.0649	5,099	172	0.0337	55.6	-7.45
Males 90+	120	36	0.3000	120	6	0.0500	803	26	0.0324	25.6	-5.06
Females 16-24	108	113	1.0463	108	85	0.7870	217,570	59,590	0.2739	1.5	-1.21
Females 25-29	53	34	0.6415	53	20	0.3774	132,639	26,015	0.1961	2.3	-1.53
Females 30-34	68	55	0.8088	68	22	0.3235	140,058	22,104	0.1578	7.9	-2.82
Females 35-39	101	67	0.6634	101	25	0.2475	134,825	18,127	0.1344	10.8	-3.29
Females 40-44	92	61	0.6630	92	28	0.3043	120,363	12,951	0.1076	5.6	-2.36
Females 45-49	72	36	0.5000	72	12	0.1667	97,305	8,583	0.0882	6.6	-2.57
Females 50-54	87	27	0.3103	87	19	0.2184	74,772	5,081	0.0680	0.8	-0.87
Females 55-59	59	23	0.3898	59	8	0.1356	53,730	2,951	0.0549	6.3	-2.52
Females 60-64	76	43	0.5658	76	8	0.1053	43,421	1,623	0.0374	17.8	-4.22
Females 65-69	89	35	0.3933	89	4	0.0449	52,215	1,254	0.0240	23.2	-4.81
Females 70-74	200	76	0.3800	200	20	0.1000	60,405	1,198	0.0198	23.8	-4.88
Females 75-79	342	116	0.3392	342	16	0.0468	42,191	803	0.0190	72.3	-8.50
Females 80-84	454	143	0.3150	454	12	0.0264	21,320	402	0.0189	110.1	-10.49
Females 85-89	314	107	0.3408	314	8	0.0255	6,045	134	0.0222	81.2	-9.01
Females 90+	75	20	0.2667	75	3	0.0400	685	13	0.0190	12.1	-3.48
Total	5,212	2,865	0.5497	5,212	980	0.1880	2,291,738	438,945	0.1915	444.8	-21.09

*Bold indicates statistical significance at 95%

VIII. Summary and Recommendations for Future Analysis

The methods presented here to evaluate the impacts of changing the length of the license renewal cycle involve relatively simple statistical comparisons. It may be possible to employ more sophisticated techniques such as regression analysis to control for other factors affecting those comparisons. However, other techniques would also require additional data, much of which could be costly to collect. The analytical techniques employed are consistent with those commonly used in driver studies. They provide a relatively straightforward and inexpensive means of assessing program impacts.

The results presented in this report concerning the impacts of the new eight-year renewal period should be considered preliminary. For the overall driving population, drivers who renewed by mail have fewer crashes and citations per driver as well as lower monthly crash and citation rates in the period after last license renewal than both groups of drivers who renewed in person. However, a comparison across groups prior to the new renewal policy indicates that drivers who renewed by mail had lower incident rates than both groups of drivers who renewed in person prior to their last renewal. This suggests that there may be other underlying factors that differentiate drivers among the groups, making cross-comparisons less useful.

For drivers who have renewed by mail since January 2000, preliminary evidence from this study does indicate a negative effect on traffic safety for most age and gender categories, particularly with respect to crashes. However, data are not yet available to assess the full impact of the policy. Currently, only drivers with the best historical driving record have gone more than four years since their last visit to the DMV. No drivers have gone a full eight years. In addition, for the drivers who renewed by mail, current analyses of crashes and citations include a very short period of time, ten months or less. Future updates of the analysis are essential in determining the full impacts the longer renewal cycle.

Because of the problems encountered when trying to compare across groups, extending the before and after analysis is recommended. Under this method, all drivers will be moved to group 1 after they reach their fifth year, whether by renewing by mail or because they have an eight-year license. As a long-term approach this method is preferable, because over time it will include an increasing proportion of the entire licensed driving population. As discussed earlier, it is useful to perform this type of analysis on drivers who have not yet reached a fifth year of an eight-year license. This information allows better interpretation of the before and after analysis. Thus it is critical that the data needed to distinguish the driver groups used in this study be retained for future analyses.

In assessing the impact of behavior reports, the results of this study are clear. The number of crashes and citations per driver for one year after the issuance of a report were significantly lower than during the year prior to the report. Drivers with reports have significantly more crashes and citations than the driving population as a whole. In light of the longer renewal cycle, which means less frequent observation of drivers by DMV staff, the use of behavior reports as a tool for identifying high-risk drivers becomes even more important. In addition, although the number of incidents per driver after the submission of a report is still generally higher than that of the rest of the population, the magnitude of reductions seen

following the reports is promising. The results of this study indicate that the use of these reports is an effective tool for improving traffic safety.

Appendix A. Licensing Alternatives Relating to High-Risk Drivers

The issue of how best to license drivers while balancing time and cost constraints against safety issues is not an easy one. While the federal government does provide some research and recommendations, states are primarily responsible for this task. Researchers, states, and national governments have proposed and tested a variety of ideas for dealing with the issue of high-risk drivers and how to identify them. This section provides a sample of these ideas.

In an article in *Dickinson Law Review*, Ellen Demont proposes a number of changes to the licensing process that she believes can help better identify high-risk drivers and create a safer driving environment.¹⁹ First, she suggests more stringent licensing laws requiring more comprehensive testing including vision screens that include dynamic acuity, field of vision, depth perception, and night blindness; hearing; motor skills; aptitude of traffic control devices; and understanding of traffic rules. She also recommends four-year in-person renewals for most drivers under 65, and two-year renewals for those over 65 and for drivers who have a history of frequent traffic violations. In addition to licensing regulations, she calls for the expansion and encouragement of safe-driver programs and harsher penalties for drivers who voluntarily engage in risky driver behavior, including punitive damages for negligence. No quantitative analysis is presented in support of these recommendations.

Other studies focus the effectiveness of specific programs, policies, and procedures. The State of Utah utilizes special procedures for licensing drivers who report medical conditions. In effect since 1979, the program categorizes drivers according to functional ability level and grants unrestricted or restricted licenses accordingly. Drivers may be limited by speed, driving area, or time of day. A 1999 study sponsored by the National Highway Traffic Safety Administration compared crash and citation data for unrestricted and restricted drivers with medical conditions as well as matched drivers with no medical conditions.²⁰ The number of crashes, at-fault crashes, and citations per driver day were analyzed separately for different age, county of residence, and gender subgroups. Each functional ability category was analyzed separately. The study found that overall, unrestricted drivers with medical conditions had higher incident rates than comparison groups with no reported medical conditions. Restricted drivers had similar citation rates to their comparison groups, but higher crash and at-fault rates than their counterparts in many cases. Restricted and unrestricted drivers with alcohol and other drugs and vision conditions had consistently higher incident rates using all three measures. A number of other categories were associated with higher crash and at-fault crash rates for unrestricted drivers. Thus the study found that while the program has improved safety in some respects, it does not completely cancel out the effects of certain medical conditions on driving behavior.

One of the more recent developments in assessment techniques is a screen-based hazard perception test (HPT).²¹ The test, implemented in the State of Victoria in Australia, allows individuals to observe various traffic scenes on a computer screen. The driver touches the screen

¹⁹ Ellen H. Demont, "High-Risk Drivers: The Privilege to Drive Does Not Include a License to Kill," *Dickinson Law Review*, (Summer 1989).

²⁰ E. Diller et al., *Evaluating Drivers Licensed with Medical Conditions in Utah, 1992-1996*, National Highway Traffic Safety Administration, (June 1999).

²¹ Ron Christie, *Driver Licensing Requirements and Performance Standards Including Driver and Rider Training*, National Road Transport Commission, (May 2000).

each time a driving action is observed that he or she believes they would attempt while driving. Trials indicated that the test effectively identified drivers with “poorer levels of perceptual and cognitive skills required to detect and respond appropriately to driving hazards that may lead to crashes.” To date, no other jurisdictions have implemented HPT programs, but the tests are being explored other parts of Australia and in other countries. Development costs from scratch are estimated at \$500,000-\$1,000,000 with additional rollout costs.

The State of California has taken a very active role in testing and researching various approaches for improving driver safety. The Research and Development Branch of the Department of Motor Vehicles has published a number of reports concerning licensing and post-licensing control programs. These studies have affected both state and national policy. Results from some of the more relevant studies are discussed here.

One of California’s more recent programs is the Driver Performance Evaluation (DPE), a new pilot driver test being used in several southern California field offices. A 1998 study explored whether the program is resulting in a change in the risk of accident involvement or citations.²² DPE is more comprehensive and represents more common traffic conditions than the standard driving test offered in California. It requires a standardized skill test that must be conducted prior to on-road testing. Drivers are scored in maneuver categories during the on-road test and a standard scoring criterion is used. The original version included freeway driving and a turn-and-stop skill test. These elements were later dropped due to financial and workload constraints. The DPE takes roughly 1-15 minutes longer than the standardized test. Four groups of drivers were compared as part of this evaluation study: applicants evaluated under DPE, applicants evaluated under the standard test from the same test region prior to implementation of DPE, applicants administered the standard test in comparable not-pilot areas before DPE, and applicants administered the standard test in comparable not-pilot areas after DPE. The evaluation criteria used include total accidents, fatal/injury accidents, and total citations. The study found no significant benefits of DPE to offset the increased costs, although researchers believe that the DPE is a better test.

California, like many other states, has a program that allows drivers with citations to attend traffic violation school in exchange for having citations dismissed and masked from their driving records. The rationale is that such programs will educate and change drivers’ attitudes about risky driving behavior leading to safer driving habits. A study published in 1995 evaluated the program’s effectiveness.²³ The study confirmed earlier studies that such programs are minimally effective. Knowledge and attitude changed by 8% only. The relationship between this change and fewer subsequent citations was small, and was not significantly related to subsequent accident involvement. While this study does not provide evidence about the effects of programs used by other states, it does indicate that policy-makers should not automatically assume positive results from such programs.

²² Michael A. Gebers, Patricia A. Romanowicz, and Robert A. Hagge, *An Evaluation of the Impact of California’s Driving Performance Evaluation Road Test on Traffic Accident and Citation Rates*, Licensing Operations Division, California Department of Motor Vehicles, (December 1998).

²³ Michael A. Gebers, *Knowledge and Attitude Change and the Relationship to Driving Performance Among Drivers Attending California Traffic Violator School*, Division of Program and Policy Administration, California Department of Motor Vehicles, (February 1995).

A special driver test (SDT) is used for California drivers who cannot pass the standard regular driver test and drivers with known physical or psychological problems that could affect their driving skills. To fail, a driver must make a serious maneuver error resulting in either a crash or threat to driver or pedestrian safety. The test was evaluated in a study released in 1995.²⁴ Pre-SDT and post-SDT accident and citation rates were compared for drivers participating in the program. In addition, rates for a random sample of non-participant drivers were computed and analyzed. The study found that SDT was not an effective tool. Drivers who passed the test remained at a significantly higher accident risk than the general population. Risk decreased for those who failed the test, but since they would have also failed the regular driving test, the program does not provide any significant benefit. As a result of this study, the entire SDT program is being reevaluated and revamped.

California's Mature Driver Improvement (MDI) program provides drivers ages 55 and older classroom training on how to improve their driving skills in exchange for reductions in their insurance premiums. The voluntary program was initiated in 1987. Several studies were performed using crash and citation data to determine whether the program has had an impact on driver safety. Janke reviews five of these studies in a report published in 1994.²⁵ Drivers participating in the program were compared with drivers of similar ages who did not participate. The results were mixed. While a number of studies showed a decrease in citations, a reduction in crashes was not observed.

²⁴ Robert A. Hagge, *Evaluation of California's Special Drive Test Program*, Division of Program and Policy Administration, California Department of Motor Vehicles, (September 1995).

²⁵ Mary K. Janke, "Mature Driver Improvement Program in California," *Research Issues in Bicycling, Pedestrians, and Older Drivers*, Transportation Research Board, (1994).

Appendix B. Driver Licensing Procedures in Other States

One objective of this study is to identify licensing procedures employed by other states. Of particular interest were other states within the same region as Wisconsin. These include Illinois, Iowa, Michigan, and Minnesota.²⁶ This section compares and contrasts different aspects of each surrounding state's procedures.

Graduated License Program

Like Wisconsin, all four neighboring states have special processes for licensing younger drivers who are applying for a license for the first time. Each state has two types of licenses or permits that must be obtained before a license with full driving privileges is issued. The initial age for official driver learning status varies from state to state, as does the age when a driver is eligible for full driving status. All of the programs are relatively new, and to date there has been little empirical analysis of their effectiveness in reducing the accident and citation rates often associated with new teenage drivers in these states. However, studies in Maryland and California have found a significant reduction in the number of crashes and citations among young people after instituting similar programs.

Michigan's program is the oldest, having been instituted in 1997, and consists of three license levels. Individuals who are at least 14 years, 9 months, have had one segment of driver's education including six hours of driving instruction, and who pass vision and health standards can obtain a Level 1 license with a parent's consent. Level 1 drivers may only drive when accompanied by a licensed parent or guardian or an appropriately designated adult. When the teenager turns 16 and has had a Level 1 license for six months, he or she is eligible to apply for a Level 2 license. This requires the completion of the second segment of driver's education, no convictions, civil infractions, suspensions, or crashes in the past 90 days, and parent certification that they have had 50 hours of driving experience including ten hours at night. To obtain the license, the driver must pass a road test and pay a fee. Level 2 drivers can drive without supervision from 5:00 am to midnight. Driving is permitted between midnight and 5:00 a.m. only if driving to and from employment or is accompanied by an adult. When the driver is 17, has held a Level 2 license for six months, and has had no moving violations or suspensions in the last 12 months, he or she can obtain a Level 3 license. A Level 3 license allows young drivers to have full license privileges. All drivers are eligible for a regular driver license after reaching the age of 18.

The graduated licensing system in Illinois became effective in January 1998. Teenagers who are fifteen become eligible for the permit phase. Here they can receive an instruction permit

²⁶ California and Montana were also of initial interest for this study. Both were initially believed to allow eight years between in-person renewals. It was hoped that either state might be able to provide evidence concerning the effects of this policy. As it turns out, California allows for two consecutive extensions by mail, but only under certain criteria. Thus the state's renewal process is not very similar to Wisconsin's. Montana did convert to an eight-year renewal cycle in 1995. The cycle applies to all drivers between 21 and 75. Unfortunately, no studies or analyses have been conducted to examine the possible effects, although accidents and traffic deaths have not obviously increased. In order to help reduce any possible effects, Montana actively encourages law enforcement personnel to report bad drivers and get them in for reexamination. In particular, behavior reports are now used far more frequently.

if they are enrolled in an approved driver's education course and pass a vision screening and knowledge test. The permit allows the driver to practice driving skills in class or when accompanied by a guardian or parent-approved adult. The instruction permit is valid for 24 months. Anyone 15 or younger who is caught driving without a permit will be unable to receive a license until age 18. Drivers who are 16-17 and have held an instruction permit for at least three months are eligible to apply for a driver license. To obtain a license, the driver must present a "Certificate of Completion" signifying completion of the behind-the-wheel portion of driver's education. These applicants must also submit their instruction permits and written certification from a guardian that they have had at least 25 hours of behind-the-wheel practice time and are able to safely operate a motor vehicle. Although a State of Illinois road test is required for adult drivers, high school students may not be required to take the test if they have taken a driver's education course that meets certain criteria including a road test. Individuals who are at least 17 years, 9 months are not required to enroll in driver's education to obtain the permit. Similarly to Michigan, Illinois maintains curfew hours at which time drivers under the age of 17 must be accompanied by a parent, guardian, or responsible adult. All drivers under the age of 21 are subject to a zero-tolerance alcohol policy.

Minnesota and Iowa both instituted graduated driver-licensing programs in January 1999. Similar to Michigan's three-level process, there are three phases for licensing younger drivers in Minnesota. Phase I is considered an instruction permit. To apply, an individual must be at least 15 years old, have completed 30 hours of classroom driver's education instruction, and currently be enrolled in behind-the-wheel education. The applicant must then pass vision and written tests and pay a fee. Instruction permit holders may drive only when accompanied by a driving instructor, guardian, or other licensed driver who is 21 or older. All passengers must use a seat belt. Phase II consists of the provisional license. To qualify, the driver must be at least 16, have completed driver's education, have held an instruction permit for at least six months with no moving or controlled substance violations, and have had at least 30 hours of on-the-road driving experience including ten hours at night. The driver must then pass a road test and pay a fee. Anyone accompanying a driver with a provisional license is required to use a safety belt. When a driver turns 18 or has held a provisional license for at least a year with no controlled substance violations or crash-related moving violations and no more than one moving violation, an applicant is eligible for Phase III, a full license. This license requires paying a fee. If the driver is under 18, certification that he or she was supervised while driving for at least ten hours by a licensed driver over 21 is also required. There are no restrictions associated with a full license.

Among the four states, Iowa has the youngest age requirement for its young driver program. Individuals are eligible for an instruction permit at age 14. To obtain this permit requires written approval from a guardian, vision screening, and knowledge tests. Driving with an instruction permit requires supervision by a guardian, family member over age 21, driver's education instructor, or other authorized driver over 25 years of age. There must be a seat belt for every passenger. The driver must also enroll in a driver's education course, with at least 30 classroom hours including certain curricula, and six hours of driving, including at least three behind the wheel. After holding an instruction permit for at least six months and logging 20 or more driving hours including a minimum of two nighttime hours, a driver who turns 16 may apply for an intermediate license with parental approval. An intermediate license allows the teenager to drive unsupervised between 5:00 a.m. and 12:30 a.m. A waiver may be granted to

allow unsupervised driving at other times for certain school or work-related activities. Drivers should also accumulate at least ten hours of supervised driving (two or more at night) while holding an intermediate license. Again, a seatbelt is required for each passenger. After holding an intermediate license for at least 12 months and remaining accident and conviction-free for 12 consecutive months, the driver may apply for a full license after turning 17 and with parental consent. If a driver with an instruction permit or intermediate license is convicted of a moving violation or contributes to involvement in an accident, he or she will be referred to the Remedial Driver Improvement program where additional restrictions may be applied after meeting with a DOT official. These drivers must also begin their 6 or 12 month accident- and conviction-free periods before advancing to the next level. There are no restrictions on drivers with a full license.

First-Time Adult Driver Licensing

While the general process for obtaining a driver license is similar, there are some differences in the initial licensing procedures for adults among these four states. They all require a vision screening for license applicants, but the requirements for passing vary slightly. All four states administer a knowledge test, either in writing or electronically. These tests are designed to test an applicant's knowledge and understanding of traffic signs and signals, state traffic laws, and safe driving practices. Michigan and Minnesota both issue instruction permits after an individual has passed the knowledge test. In Michigan, while the permit is valid for 180 days, a driver may take a road test after 30 days. In Minnesota, the permit is valid for one year. A licensed driver must accompany permit holders. An appointment for taking the road test can be made at any point during the year. All four states require a road test before issuing a driver license. In Michigan, road tests are conducted by approved independent testing agencies. In the other states, a state agency administers the exam. In Michigan, all original license applicants are placed on probation for a minimum of three years. Probation ends only after a driver has not had a crash, violation, or suspension for ten consecutive months.

Renewals

All four states require driver license renewal every four years, but Michigan, Illinois and Iowa allow for renewal by mail or telephone under certain circumstances. All-in person renewals require a vision screening. In Michigan, all drivers renewing in person must also take a short written renewal test. In Illinois, all drivers except those with no traffic convictions must take a written test. In all cases, additional testing, including road tests, may be required in certain situations such as changes in physical or mental condition or excessive crashes or convictions over a certain period of time.

To be eligible for renewal by mail in Michigan, an individual's driving record must be clear of any traffic convictions and civil infractions for the past four years, and there must be no change in the driver's physical or mental condition since the last renewal. Also, the driver's next renewal must be in person. Similarly in Illinois, the Safe Driver Renewal program allows drivers with clean records to renew by mail or telephone. Enacted in 1997, it applies only to drivers between 21 and 75, requiring them to visit driver services facility only once every eight years. Renewal by mail is also an option for some drivers in Iowa. To be eligible, drivers must be

between 18 and 65, have a clear driving record for the last four-year term, and not have any convictions, sanctions or offenses or have been the cause of any accidents.

Medical Conditions

Similar to Wisconsin, all four states require self-reporting of medical conditions that might affect driving ability as part of the application process. In Illinois, a positive response mandates that a doctor complete a form. In Iowa, Minnesota, and Michigan the driver may be required to see a physician and provide a medical statement from the doctor. In all cases, medical conditions may lead to further testing, driving restrictions, and/or more frequent renewals.

Special Provisions for Older Drivers

There has been much research and debate about the effects of aging on driving ability. The issue is of particular concern as the “baby boomer” generation passes through middle age. Over the next twenty years, the population over age 65 is expected to grow by 60 percent.²⁷ While a specific age itself is not a good predictor of whether a driver may safely operate a vehicle, certain age-related changes in functional ability may affect a person’s driving ability. Many of these changes can be overcome by making drivers aware of them and teaching drivers ways for compensating for these changes to allow for continued safe driving. As a consequence, many states have special procedures for evaluating older drivers in hopes of identifying potential risks before they become a major problem. Of the four neighboring states, Illinois and Iowa have such provisions. The process for license renewal in Illinois for elderly drivers is the most stringent in the country. The measurement standards for successfully renewing are the same as with other drivers, but more frequent testing is required. In Illinois, drivers who are 74 and older are not allowed to renew by mail or telephone. In addition, they are required to take a driving test when they renew in person. Drivers between ages 81 and 87 must renew in person every two years. Drivers who are 87 and older must renew in person every year. In Iowa, if a driver is 65 or older, he or she may not renew by mail. Also, drivers who are 70 and older must renew every two years.

²⁷ Loren Staplin et al., *Safe Mobility for Older People Notebook*, National Highway Traffic Safety Administration, (April 1999).